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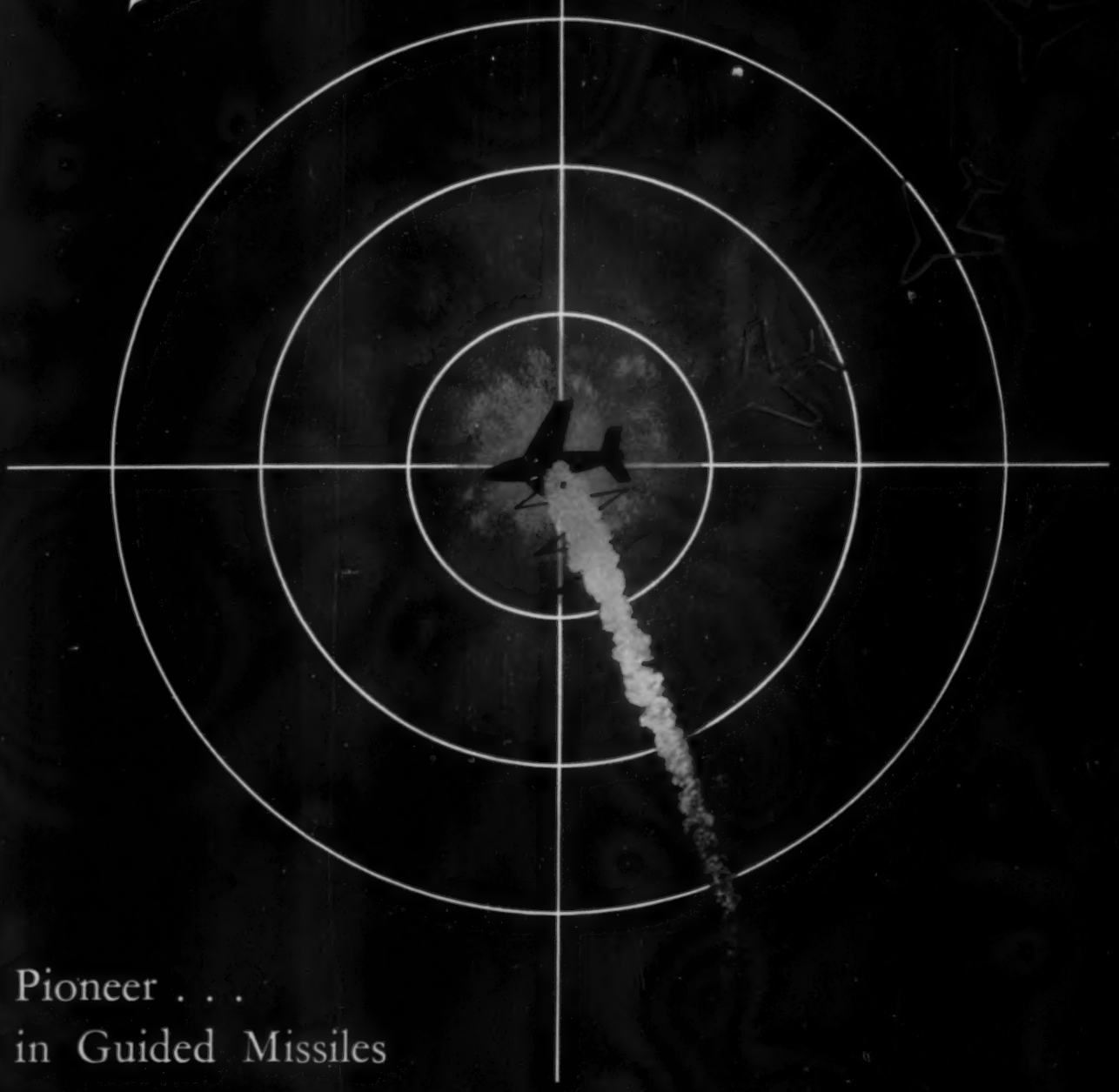

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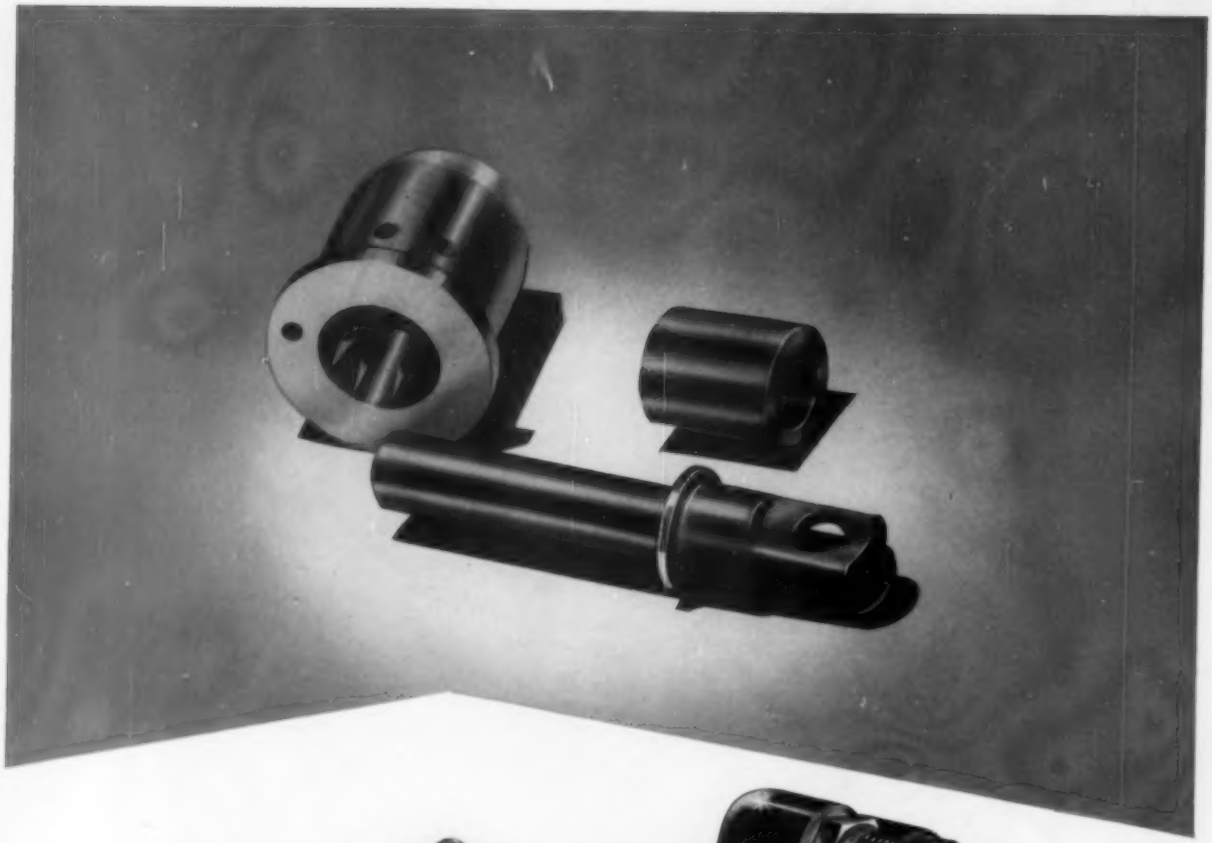

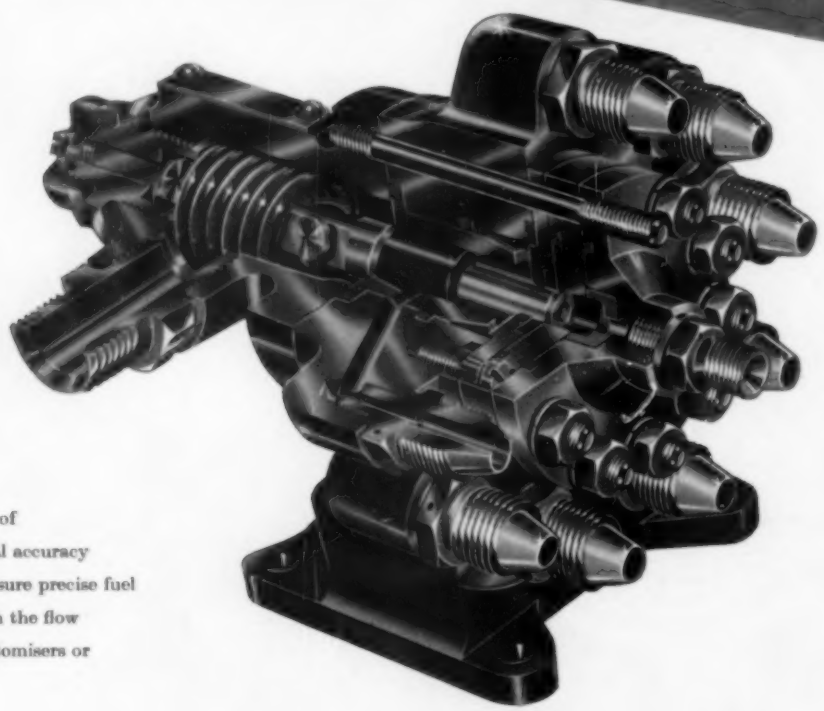

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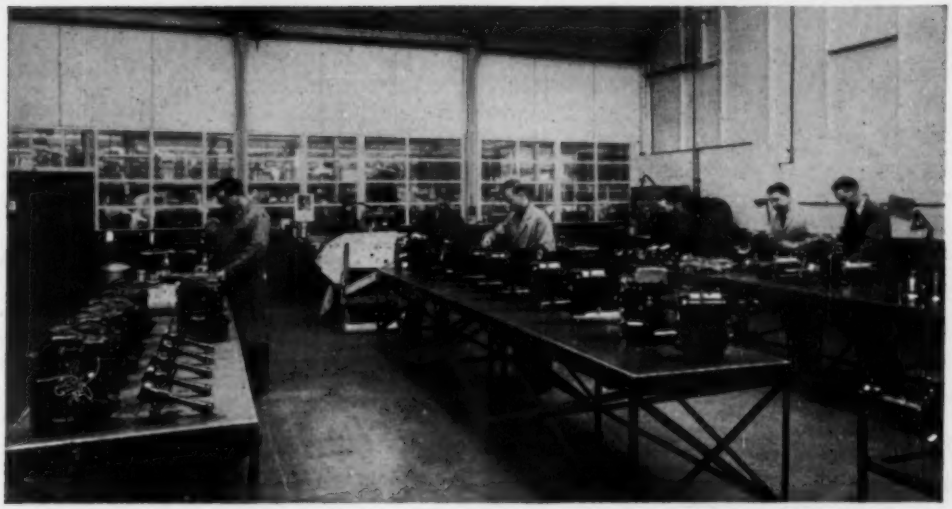

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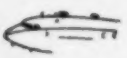

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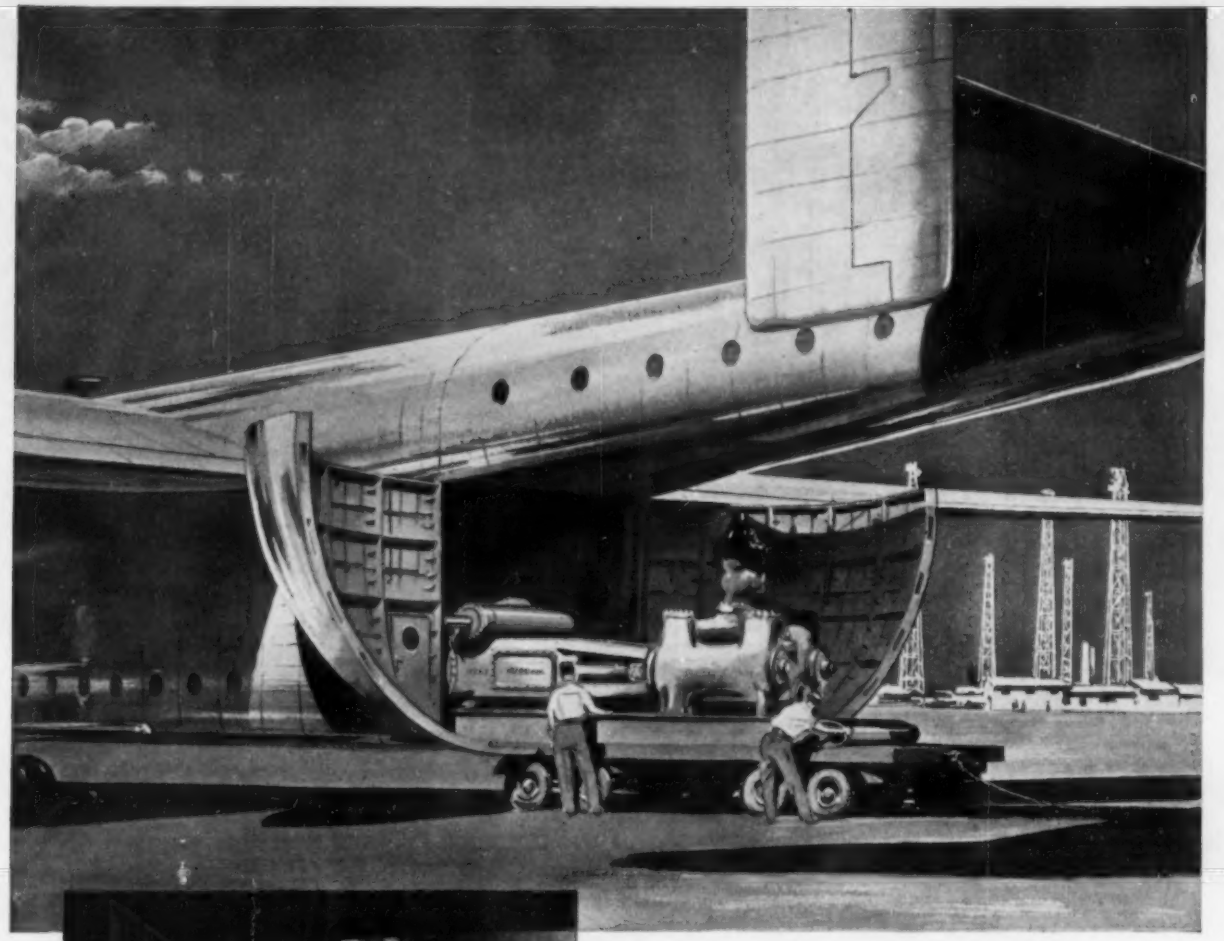

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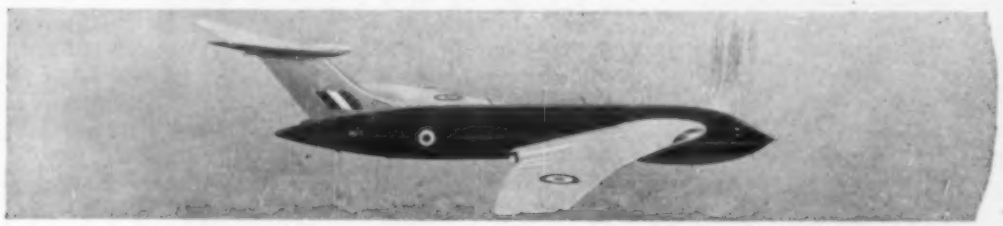

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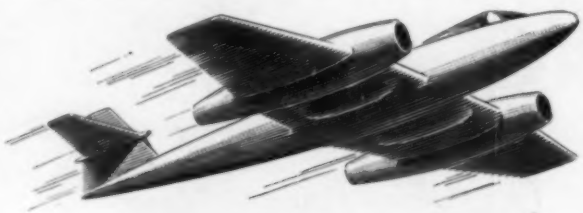

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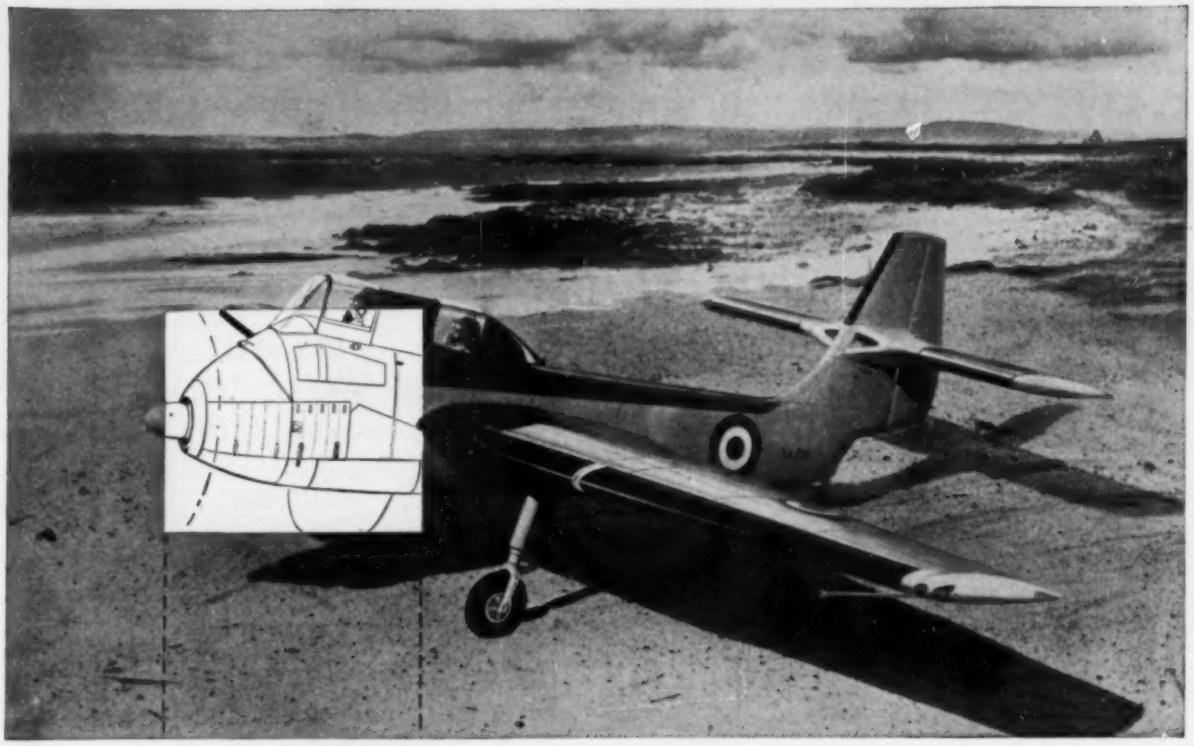
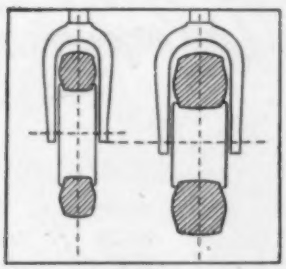
Sand strip – *Seamew* base

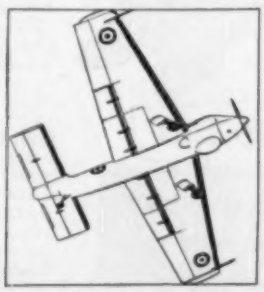


Simplicity of design ensures simplicity of maintenance—and economy in initial cost and in use of spares and manpower. Removable panels make components easily accessible.



The wheels of the Seamew can be swiftly changed, with differing sizes of tyre to suit the surfaces from which it operates.

Seamew—a tough, economical, all-weather submarine hunter. Airborne in a short distance from any rapidly constructed airstrip—or even a stretch of beach—the Seamew can conduct a maritime search with up-to-date radar equipment and use a variety of weapons to effect a kill. Its high manoeuvrability, low stalling speed and fixed shock-absorbing undercarriage enable the Seamew to land back safely after operating in weather conditions impossible for other anti-submarine aircraft.



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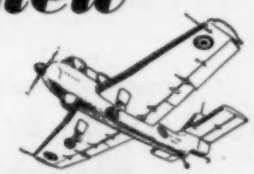

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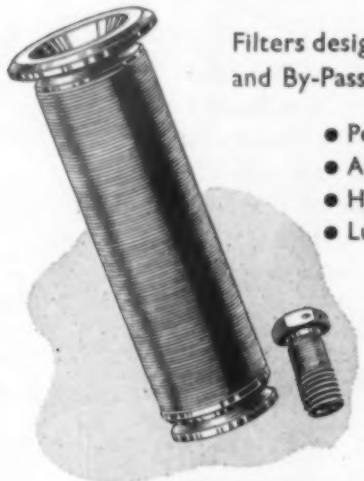

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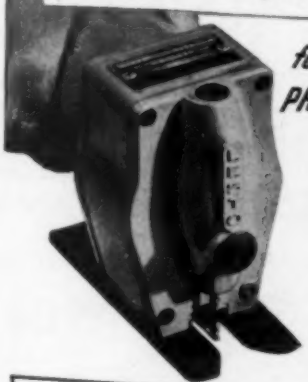

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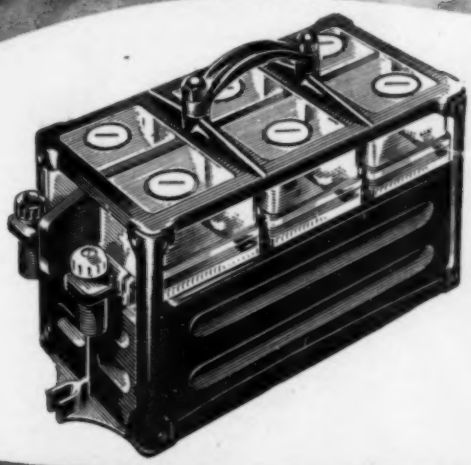

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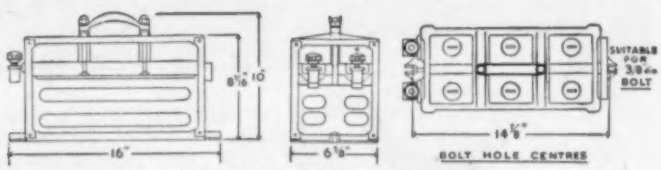

Side and end views of 6-EP19B/2 with battery layout diagram

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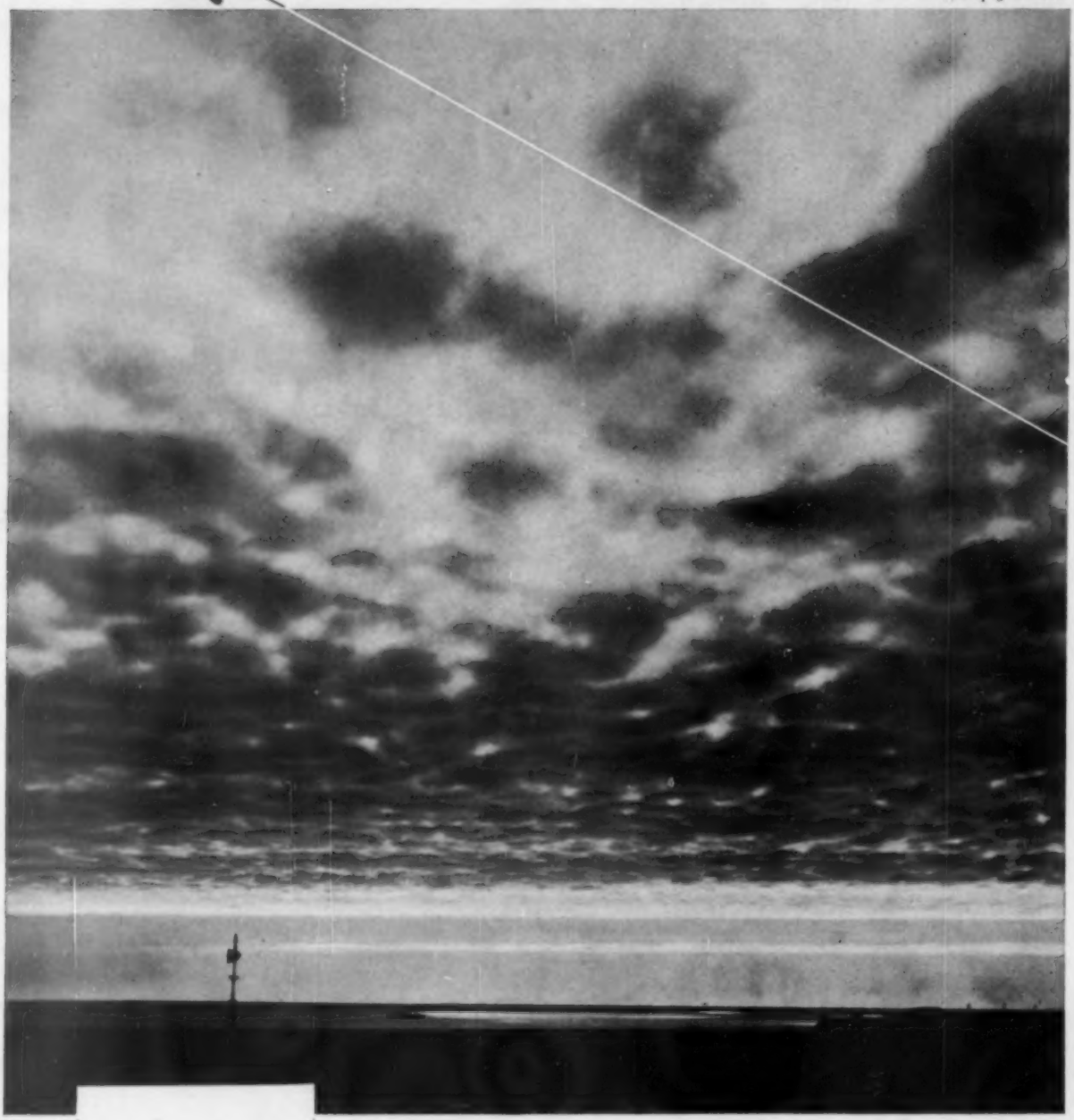

Weather map symbol for Strato Cumulus

STRATO CUMULUS. Composed of a layer or patches of lamina or globular masses, these clouds vary in depth between 500 and 2,000 feet. They offer little hazard but great inconvenience to pilots, since they may stretch unbroken for some hundreds of miles and remain undisturbed for several days. The Javelin pilot is fortunate. His far-seeing radar equipment makes little of such conditions—and this, combined with the Javelin's ability to fly and fight at over 50,000 ft. at speeds of 600-700 m.p.h. gives him the most formidable *all-weather* interceptor in the world.

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Founded 1909

No. 2377 Vol. 66. FRIDAY, 13 AUGUST 1954

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Editorial, Advertising and Publishing Offices:

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Telegrams, Flightpres, Sedist, London.
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Capital News!

OVERLEAF is recorded a most welcome and encouraging event: the signing of a firm order for 37 Vickers Viscounts by Capital Airlines. The announcement brings this American operator's total of orders to 40 and at the same time a further option has been taken on 20 more Viscounts. The value of the order is a round £16m, easily the largest ever placed by an American customer for British civil aircraft.

On his recent visit to London, the president of Capital, Mr. J. H. Carmichael, reiterated his enthusiasm for the aircraft, spoke of it as the next logical step, and confirmed its great passenger appeal among Americans who have already ridden in it on European routes. Congratulations to maker and customer alike.

Unworthy and Misleading

NOBODY other than a few American anglophobes and those Soviet operators charged with the job of driving wedges between North Atlantic Allies can have taken pleasure in a certain report of the Senate Appropriations Committee which showed signs of making dubious headlines last week. The backdoor manner in which such a document can leak out—a source of amazement to people in this country—may perhaps be regarded as appropriate to the information provided in this instance; and a few days later everyone was glad to hear Mr. Harold Stassen, United States Foreign Operations Administrator, discredit it in outspoken terms. He is reported to have said that it was "one of the most inaccurate investigators' reports I have ever seen."

Broadly speaking, the report (some passages from which we quote on p. 196) alleges that the British aircraft industry, the recipient of vast sums of American dollars and other aid in kind, has used some of it to develop civil airliners which are competing with American products. It goes on to suggest that the Hunter, Swift and Javelin are obsolescent and should not be purchased with American military-aid funds. The money would be better spent on home-built American fighters with British engines installed, the investigators suggest. Indicative of muddled thinking on the question of transport derivatives is their apparent belief that the Vickers jet transport—presumably the V.1000—is a version of the Valiant.

It is only fair to add that the report does not imply misappropriation by British manufacturers or authorities; to judge from a brief examination of dreary pages of figures, quotations and deductions, its main theme seems to be that those responsible for arranging and administering American military-aid programmes have not been very smart.

There is enough fact and truth mixed in with chaff and bias to give a veneer of versimilitude, but the carping approach is a complete negation of the spirit of American aid.

Undoubtedly the British people have benefited immensely, both during and since the war, from American generosity. Also, we and other European countries have been glad to accept help from America in building up our military strength, knowing it would be used, if at all, in a mutual cause. Few people would attempt to deny that a little of the monetary aid and equipment provided to facilitate development and production of military aircraft has indirectly benefited civil projects running side by side with them. We doubt, however, if the civil-aircraft picture would have been appreciably different in the absence of such help.

As we understand it, the idea behind all the mutual-aid schemes between the Allied countries—and this nation has not been ungenerous—has been to combat all forms of Communism, broadly by replacing want, lassitude and weakness with financial stability, industrial activity and military strength. If this conception is correct, reasons for the financing of production outside America are obvious. That for a given sum of dollars you can expect to get three times as many aircraft in Europe as in North America is important—and overlooked in the report.

We note that Mr. Stassen comments that fighters like the Hunter are not obsolescent and "will be the first to fight for the free world if there is a war in the next five or six years." Overseas orders for Hunters have now reached the enormous total of £120m. In supporting his assertion we would add that the state of development of these fighters (and of power units for them) is hardly likely to remain static during the coming few years.

FROM ALL QUARTERS

Canberra's New Cousin

COMPLETELY redesigned cockpits and enclosure, air brakes on each side of the fuselage, and new armament, are characteristics of the "B" development of the Martin B-57 light bomber, a counterpart of the Canberra B-8 introduced to readers in last week's issue. Photographs appear below.

The primary advantage of the new cockpit is greatly improved visibility for the crew of two, who are seated in tandem beneath the beautifully formed enclosure, with navigator/radar operator/bomb-aimer on a higher level than the pilot, in order that he can aid in seeking-out targets. Further improvements have been made to the windscreen, and new anti-icing, bullet-proofing and anti-fogging arrangements are incorporated. The speed brakes on the aft portion of the fuselage are roughly triangular in shape and open outwards from the rear under hydraulic action. When fully operated they move in co-ordination with the familiar finger-type brakes on each wing. Several advantages are claimed for the new brakes, notably that they permit steeper dives, give more speed control during low-level operations, and better pilot-control on landing approaches.

A typical under-wing armament load is four napalm tanks and eight 5in rocket projectiles. Additionally there are eight 0.5in guns in the leading edges of the wing, and a useful internal bomb load, carried in the Martin-developed rotary bay, which allows bombing runs to be made without reduction of speed and without adversely affecting the handling characteristics of the aircraft.

B.O.A.C.'s Princess Plans

FOLLOWING a week-end visit to the Saunders-Roe factory at Cowes, Sir Miles Thomas has reiterated B.O.A.C.'s proposal to operate the Princess flying-boats if and when a suitable new turboprop is available. This engine should enable the Princess to perform economically over a range of 5,000 miles. Sir Miles said that two routes were under study: from Southampton to New York (where Capt. H. W. C. Alger had, in 1950, found an ice-free alighting point); and a route to Sydney *via* Bermuda, Mexico and the Pacific.

A 10,000 m.p.h. Bomber

A MANNED rocket capable of Mach 14—about 10,000 m.p.h., depending on height—is foreshadowed by Dr. Walte Dornberger, the war-time chief of Germany's Peenemünde research station, where the A.4 ("V.2") rocket was developed.

Interviewed at Innsbruck (where he is attending the International Astronautical Congress) by Leonard Bertin, *Daily Telegraph* science correspondent, Dr. Dornberger said that such a rocket would be of the two-stage variety, launched from a mother aircraft of similar design at 80,000ft. At the moment of separation both would be travelling at Mach 5.

While the carrier was taken back to its base by its pilot, the smaller craft would be rapidly accelerated by its rocket motors to a speed of Mach 14 and a height of 150,000ft.

At such speeds, Dr. Dornberger said, it would be unable to turn, but its residual velocity would take it in roughly a straight line to a friendly air base, possibly nearly 10,000 miles away. Its pilot could drop his 2,500 lb payload of bombs on the way.

Photographs of a wooden model (says Leonard Bertin), almost certainly altered to hide its most secret details, made the machine look like two tailless delta-winged aircraft of almost identical design. The two wings, one on top of the other, gave the impression of a futuristic biplane.

Pointing out that both Dr. Dornberger and his ex-Peenemünde colleague Krafft Ehricke are now members of Bell Aircraft Corporation's preliminary-design department (which was responsible for the Mach 2.5 Bell X-1A), the correspondent reports that he learned "from other sources" that the U.S. Government has contracted for design-studies of the Mach 14 project; no decision, he says, has been made to build it.

Forest Warfare

ON page 203 of this issue are some notes on a major forest-spraying operation recently completed in Canada. Now comes news of a comparable offensive now being undertaken in England. In Canada the pest is the budworm, which wreaks havoc in the fir and spruce forests; here it is the larva of the pine-looper moth (*Bulpalus Piniarius*) which has been making increasingly severe depredations in pine forests. Last summer about 120 acres of pine in the forest of Cannock Chase were found to have been completely defoliated.

The Forestry Commission accordingly called in Pest Control, Ltd., of Cambridge, and some 2,500 acres in Cannock Chase—mostly of trees between 40 and 45 ft high—are now being treated with Psylortox, a D.T.D. emulsion, which is being sprayed from two of the company's specially equipped Austers. The pilots are Mr. Henry Johnson and Mr. John Jones. Immediately the operation is completed, the two aircraft will begin a similar attack on pine looper caterpillars which are threatening 3,500 acres of pine forest at Culbin, on the Moray Firth.

Competitive Parachuting

IN the second World Parachuting Championships, held at St. Yan in Southern France from August 2nd-7th, a team of British parachutists found themselves up againt formidable opposition. In the final team positions the U.S.S.R. led with 1861.5 points, followed by Czechoslovakia with 1598.5, France with 1581 and Jugoslavia with 1429. The British team secured a total of 1,092 points and Italy was last with 701.

The lone American competitor made a personal score of 348.5, giving him an individual position of 21 out of a total of 31 competitors. The individual world championship was won by Fetchichine of the U.S.S.R. with a brilliant score of 672. Second was his team-mate Marutkine with 610.5 and third Clasak, chief of the French Civil Parachuting Centre, with 582.5. Sgt. Moloney of Great Britain was seventeenth with a score of 400.5.

Against expert opposition—the Russians, for instance, had trained intensively for a year for the competition—there was little chance of a British win; the Britons had been training for only a month. However, by the end of the competition the Decca blind-dropping technique had proved itself beyond doubt and the British parachutists were steering their G.Q. blank-gore parachutes into the target area with great regularity. (A blank-gore parachute is one from which a complete gore, or segment, is omitted to give improved stability.)

Next week we hope to publish an account of the Championships by Maj. T. W. Willans, captain/dispatcher of the British team, which was made up as follows: F/L. W. H. T. Hay, F/Sgt. H. Wood, Sgt. T. Moloney, Sgt. N. Hoffman, A. J. Harrison; reserves, F/Sgt. D. Sutton and F/Sgt. A. Card. The G.Q. Company's Rapide from which the team jumped was piloted by Sir Raymond Quilter and other team-members were the Decca operator, Capt. P. Huggins, J. Beadle (met. liaison) and Frank Dodds (packer).

DARK DESTROYER: The Martin B-57B, subject of a news item above, is a singularly handsome aircraft, not only by virtue of its basic design, but because of its exceedingly fine finish and the shapeliness of the new cockpit enclosure. Seen installed are rocket projectiles and napalm tanks.

High-pressure Fido

THAT the question of a Fido fog-dispersal installation at London Airport has been postponed until tests have been carried out by the Royal Air Force was mentioned by Mr. J. D. Profumo, the Under-Secretary for Civil Aviation, in a written Parliamentary answer last week.

He said that although no major engineering difficulties were expected in the construction of a high-pressure Fido, the comparative lack of success achieved so far in the United States with the only existing full-scale installation of this kind had suggested that further experiments should be conducted with a short length of burner lines in order to arrive at the best possible layout and accurate information on running and maintenance costs. This should be done at an aerodrome where the experiments would not interfere with major civil operations.

To this end it was better that the first installation should not be at a civil airfield. Only when accurate figures of the cost of clearing various degrees of fog had been ascertained would civil operators be able to assess realistically the extent to which Fido at London airport would be of economic value to them. Bomber Command had, in any case, an operational requirement for Fido, and it had therefore been decided that the experiments should be carried out at a Service airfield. The Minister did not propose to take any further action at London Airport until the results of the R.A.F. tests were available.

We learn from the Air Ministry that the R.A.F. airfield referred to is Marham, Norfolk.

CAT-O'-NINES: The prototype Grumman F9F-9 Tiger, latest of the Grumman "cat" family, is seen on its first flight on August 5th. Powered with a Wright J65 (Armstrong Siddeley Sapphire) turbojet, the Tiger is an "air superiority" fighter, designed for supersonic speed in level flight. The nose probe is an experimental pressure-and-yaw sensing head.

Strictly on the Level

THE French S.F.E.C.M.A.S. concern are justly proud of the fact that their Gerfaut delta-wing, single-seater, intercepter prototype has achieved supersonic speed in level flight—at a height of about 34,000ft—solely on the power of its Atar 101D turbojet, and without recourse to any power-boost system such as afterburning or rockets. The Gerfaut, so far as is known, is the first aircraft to claim this distinction. The pilot was M. Turcat, and the date of the achievement August 3rd.

VISCOUNT FLEET FOR CAPITAL AIRLINES

HAD the authorities at London Airport been aware of the errand which brought Mr. J. H. Carmichael to this country last week, the red carpets would no doubt have been rolled out. Accompanied by his vice-president, operations, Mr. Jim Franklin, and his chief counsel and chairman of the executive committee of the board of directors, Mr. Charles Murchison, Capital Airlines' chairman in fact came to take up as a firm order his company's option on 37 additional Vickers Viscounts and to take a new option on twenty more to make a total of 60 aircraft. The total value of the firm order to date is $46 million or a round £16m.

Deliveries (and Mr. Carmichael remarked that probably he could not have got comparable new aircraft so quickly anywhere else) are to begin with the three aircraft first ordered; they will be handed over in the first quarter of next year, and the 37 will follow on, so that all 40 should be in the airline's possession by the end of August 1956. If Capital go firm on the new option the 20 more are to be delivered by February 1957.

Announcing the new order so soon after the original one, Mr. Carmichael said that, having been able to study the aircraft and its performance more closely still, his company were even more enthusiastic than before. All the indications were that the Viscounts would be very well received by the American public and he no longer felt any need for a trial period. They were smooth, fast and competitive from any aspect.

One would like to think that this quick return to take up the option also had something to do with "inside knowledge" that other American operators may be very interested in the aircraft and with assuring early deliveries in the event of more orders being placed. A question to Mr. Franklin along these lines received a non-committal answer. If the Viscount is as good in American eyes as Mr. Carmichael believes, it is reasonable to assume that others will be wanting to get into the picture.

Noise measurements had been taken, said Mr. Carmichael, and it had been ascertained by Capital that while the sound of the Rolls-Royce Dart turboprops was certainly different, the decibel noise-level was less than for several other piston-engined types in current use. And, moreover, the Viscount climbed away more quickly and thus the duration of noise over built-up areas on take-off was shorter.

Regarding an American C. of A., Mr. Carmichael said he had not yet received any official assurance from the C.A.A. that one would be granted, but he saw no reason why it should be withheld. He foresaw no difficulties in introducing the Viscount into service; it was flexible, and it fitted in with piston-engined operations.

Training of Capital air and ground crews would also be easy enough. This order was simply a matter of going to a manufacturer 3,000 miles east instead of, as formerly, 3,000 miles west. Some key men would train in England and they would go back to America and train the others. Capital would also work closely with T.C.A., who will get their first Viscounts very shortly. T.C.A. will, of course, operate into the United States but they have rights only for terminal services. Operational problems might be a little simpler in America. There were no Customs and immigration difficulties; on the other hand, competition was very acute.

In view of the numbers of Darts now involved, Capital will set up its own engine overhaul base at Washington, D.C., forthwith. This city is both its corporate and operating headquarters.

In discussing various reasons for his company's choice of aircraft, Mr. Carmichael remarked on the substantial development ahead of the Viscount while some other types were already at the end of their stretch. Turboprops were the next logical step for his operations.

Production Viscounts are in fact nearing a change in mark. A new stage in Dart development, bringing increased power and economy, is soon to be introduced. According to the progress made with this change-over, Capital's first three aircraft and several up to a total of eleven of the new order will have Dart 506 engines. Some of the associated airframe development modifications may be included. The remainder of the order and eventually (after their first main overhaul) all the aircraft will have Dart 510s and become 700D series Viscounts. The main differences in the later turboprops are concerned with the reduction gear and turbine. A change of gear ratio and new paddle-blade airscrews will allow cruising power to be absorbed at lower airscrew r.p.m., and this will reduce even more the noise level in the aircraft. (Further notes on the 700D—page 220.)

Capital's Viscounts will be 48-seat, four abreast, semi-luxury models. They will be as standard as reasonably possible but, of course, American radio and instruments—some similar to the T.C.A. machines—will be fitted. It is not certain whether an autopilot will be fitted at all in the first place. The fleet will be standardized, this being the first aircraft design the airline has operated which is sufficiently flexible to permit this course.

On all its routes Capital, which is the largest regional carrier and ranks fifth in size in America, is in competition with one or other of the big four. The Viscount will thus fly against DC-6, DC-6B, Super Constellation and DC-7. These are, however, long-haul types and Capital's operations are essentially short haul. Capital's present Connies have an average daily utilization of 9 hr 22 min over an average stage of 297 miles. The longest services are New York to New Orleans and Twin Cities (Minneapolis/St. Paul). The longest non-stop stage (and the most important service) is Washington to Chicago, a distance of 603 miles. Last year 2¼m. passengers were carried; in 1955, with Viscount appeal, the figure is expected to reach 3 million.

COMMONWEALTH EXPANSION

THOUGH the achievements of the comparatively small number of major aircraft firms in the British Commonwealth regularly make news, less is heard of the numerous smaller yet equally progressive concerns—many of them formed, with Government encouragement, since the war—which are now playing such an important share in building up the aeronautical strength, both military and civil, of the countries concerned.

To give the overall picture of enterprise by both large and small companies is the object of a special number of *Flight* appearing a fortnight hence—on Friday, August 27th. To be known as the COMMONWEALTH AIRCRAFT INDUSTRIES NUMBER this enlarged, specially illustrated issue will contain numerous important features and will provide a unique source of reference to the background and products of the manufacturers concerned.

U.S. SELF-CRITICISM

—and a Vigorous Defence of Britain

OUR leading article expresses such views as we think can reasonably be formed on the report released last week by the U.S. Senate Appropriations Committee. This has been described by Mr. Harold Stassen, director of the Foreign Operations Administration, as "inaccurate and misinformed"—which, in our view is fair comment.

For the text of the report—from which we abstract the following—we are indebted to *American Aviation Daily*:—

Conclusions and Recommendations.—Foreign aid is being used to build up and fortify the productive facilities of other countries to the detriment of United States strategic industries. Specifically, United States taxpayers' money is being used to support, directly or indirectly, the British aircraft industry, which is heavily subsidized by the British Government. The pre-eminence which the United States has enjoyed in international civil aviation is based upon the initiative and competition generated by the free-enterprise system. This position of pre-eminence and the stability of the aviation industry are of paramount importance to America. They should not be imperilled by contributing to the support of the British aircraft industry.

The United States aircraft industry is made up of three component parts, all interdependent upon each other: (1) the engine makers; (2) the airframe builders; (3) the domestic and international airlines. A programme which endangers any one of these elements threatens the well-being of the entire integrated industry. Thousands of small component manufacturers have a vital interest in the continued stability, prosperity and expansion of the United States aircraft industry operating within the framework of the free-enterprise system.

If the United States desire to maintain close relations of mutual esteem and respect with valued allies, they should recognize the imperative need for frank, realistic, and hard trading in the extension of foreign aid. Any concept that the United States can only exercise world leadership and hold allies by providing money on terms laid down by the recipient nation is unsound and contrary to the best interests of the United States.

The effect of the grants in aid to the Royal Air Force was to release British budgetary funds for the continued subsidization of the commercial jet-development programme. A great nation capable of embarking upon a long-range and costly programme largely financed by Government to obtain mastery of the air in commercial transportation should be able to produce without foreign aid the military aircraft necessary for its national defence and the fulfilment of its obligations to the North Atlantic Treaty Organization. This is especially true since large quantities of dollar foreign exchange are not essential to the production of British aircraft.

The administrative judgment exercised by E.C.A., M.S.A. and F.O.A. is open to serious question in connection with: (1) the obligation of funds at the end of the fiscal year for the procurement of several thousand expensive machine tools without proper screening or end-use checks; (2) a failure to keep track of the distribution, use, and ultimate disposition of the tools for a long period of time after they were delivered to the Ministry of Supply; (3) a failure to inspect the tools at the British factories in which they were allocated; (4) a failure to negotiate any agreement with the British Ministry of Supply regulating the use and distribution of the tools for a matter of nearly three years; (5) a commitment to finance the procurement of British military aircraft that have not been evaluated or approved by the United States Air Force and some of which will be obsolescent when delivered; (6) a commitment to finance substantial quantities of a British military aircraft that will have only twelve to eighteen months front line service after delivery before it is scheduled for retirement from the front lines; (7) a commitment to enter into off-shore procurement contracts for two British military aircraft with the British Ministry of Supply instead of the manufacturers, thus making it impossible to control costs and to impose other essential conditions of production normally required in defence procurement contracts.

The programming, procurement, and financing of all aircraft required by the Mutual Security Programme should be decided and managed by the United States Air Force. The appropriations, if any, for foreign aircraft financing should be included in the funds allocated to military aid and should not be divided between the Department of Defence and Foreign Operations Administration. To get into the business of programming and financing British aircraft independently of the United States Air Force lends itself to the distortion of military aid by civilian policymakers in an effort to attain political and economic objectives through the use of "defence support" or "direct forces support" funds.

The British fighters being financed with United States grant aid as part of the R.A.F. modernization programme are still in the experimental stage and are not yet in full production. None can fly at supersonic or transonic speeds in level flight according to U.S.A.F. standards.

The executive agreement reached at Paris in April 1953 regarding future support for the modernization plan of the R.A.F. should have been fully disclosed to Congress when the first appropriations were requested. The formula adopted for seeking the necessary funds was misleading and the manner in which the formula was later carried out was contrary to the intent of Congress to limit the amount of economic aid to the United Kingdom. It had led to confusion, undesirable division of administrative responsibility and decisions the wisdom of which are open to serious question.

It is assumed that when the British Government spokesmen advocate "trade not aid" they mean the interplay of free competitive forces and not a method of obtaining a privileged position through the use of Government subsidies indirectly financed by the United States taxpayers.

If high policy decrees that United States grant aid should be continued in support of the British military air budget, it would be desirable to explore with the appropriate technicians and policy-makers the possibilities of supplying the British Government with the airframes of the latest American types of fighters, in which British-made engines could be readily installed. This formula, if feasible, would appear to be preferable to the present programme for the following reasons: (1) The combination of United States airframes and British engines should result in truly supersonic fighters far superior to the Javelin, Hunter, and Swift. (2) United States grant aid would not be used to build up production lines in the United Kingdom to turn out planes that are not comparable to the suggested United States-British combination versions. (3) United States taxpayers' money would be used to strengthen the aircraft industry of the U.S.A. and make jobs for American workers instead of contributing to the British programme for civil jet expansion.

Excerpts from the Report.—Nothing in the report is intended to reflect upon the good faith of the British Government. The British officials responsible for the conduct of the Royal Air Force programme have discharged their duties with competence. They planned thoroughly, dealt frankly with their United States opposite numbers, and negotiated the Anglo-American agreement most skilfully. The outcome was a financial arrangement highly advantageous to the British national interest and of dubious benefit to the United States.

As early as 1942 the British began to give attention to the development of civil aviation in the post-war period. They were motivated by a number of factors. First and foremost there was a matter of national pride and prestige. There was also a desire to obtain a commanding position in the air and to develop an industry that would produce exportable items in many parts of the world. Inasmuch as the British did not feel that they could hope to compete with the United States in the type of civil plane which the U.S.A. had developed and produced during the war, they determined to focus their attention upon the design and development of aircraft with a new form of propulsion.

The British Government since that time has been extremely active in stimulating and financing the initial costs of the development of a number of civil jet prototypes. Up to 1950 it has been estimated by the Foreign Survey Group of the Civil Aeronautics Administration that the total amount of British Government subsidies to the development of civil jet transports amounted to approximately $400 million. This estimate, which has been widely circulated and is included in a report issued by the group in 1951, has never, so far as can be determined, been seriously challenged. An effort has been made by the Civil Aeronautics Administration and the staff of the Division of Investigations to ascertain the amount of subsidies granted by the British Government to civil development between 1950 and 1954. These attempts have been unsuccessful. British authorities have said that it would be impossible to arrive at any true figure, inasmuch as the costs of military and civil aviation development are inextricably intertwined. However, it has been admitted that the amount of civil jet subsidies is very considerable.

Mr. Stassen's Remarks.—Apart from describing the report as "inaccurate and misinformed," Mr. Stassen said that one of the aims of America's aid programme was to strengthen the

R.A.F. Indirectly this helped British civil aviation but it did not amount to a subsidy to the British civil aviation industry, because American dollars earmarked for R.A.F. modernization did not replace British funds, but were added to the British budget for R.A.F. development.

Mr. Stassen further expressed the view that the report was shortsighted and that it did not give the opinion of the Committee. The Hunter, Swift and Javelin, he said, were evaluated by the U.S.A.F. as "top flight" while still in the development stage, and had proven so in actual flight. It was ridiculous to say that they were obsolescent, because it was these aircraft that would have to fight for freedom if a war broke out over the next 5-7 years. The R.A.F., with the United States aircraft stationed in Britain, formed the "lead corps" in the event of hostilities. For this reason, and because there was no doubt where they would stand in a fight, American assistance to help modernize and expand British aircraft production was in the interest of the whole free world.

There were four ways, Mr. Stassen said, by which the United States supported the British aircraft production programmes: (1) By shipping cotton, butter, and cereals to Britain at a reduced price, so that the money saved could be used to increase the R.A.F. budget; (2) by direct financial support of the R.A.F., which allows Britain to buy any product from the dollar area; (3) by ordering British aircraft for the use of the NATO powers; and (4) by some other phases of the off-shore procurement programme.

RESEARCH HELICOPTER

IN *Flight* last week we announced the existence of two types of American rocket-powered helicopters, the Kellett KH-15 (Stable Mabel) and the Rotor-Craft RH-1 (Pinwheel). Now come these supplementary details of the KH-15.

The aircraft has been built under contract from the Office of Naval Research and is itself a research vehicle for the investigation in flight of "the optimum design layout of a gyratory stabilized control system." Dr. G. J. Sissingh, Kellett's chief aerodynamicist, is claimed to have shown that the stability and control characteristics of any helicopter can be improved by the means employed on the KH-15. Although the primary purpose of the present programme is to establish the validity of a basic theory, say the makers, initial application to the light helicopter is of immediate interest. They add that the KH-15 was designed to allow a large variation of the control parameters affecting control and stability characteristics; thus, a large number of control combinations can be set up and tested without modification to the basic structure. Furthermore, combinations previously tested can easily be restored for re-examination.

Power is supplied by two rocket units manufactured by Reaction Motors, Inc., the fuel being hydrogen peroxide of 90 per cent concentration. The two fuel tanks are mounted one on each side of the pilot and are pressurized with nitrogen; the fuel system incorporates a manual throttling control.

The initial flight was made in May this year after eight minutes of tethered flight, and the machine is now being flown with a useful load amounting to 65 per cent of its gross weight. The makers report: "The helicopter is characterized by positive dynamic stability, essentially no coupling of longitudinal and lateral control, absence of feed-back of control loads to the pilot, and is, for all practical purposes, free of vibration both in the air and on the ground. . . . It is already apparent that the control system results in a helicopter having positive dynamic stability without loss of control response throughout the speed range. The Kellett control system is considered applicable to any helicopter of any type or size."

Salient data are: Aerofoil section, NACA 0015; rotor diameter, 18ft; swept area, 254·4 sq ft; solidity ratio, ·0354; weight empty, 234 lb; gross weight (take-off), 644 lb.

The fuselage of the KH-15 is an open steel structure, with an open-truss boom supporting the variable-pitch tail rotor.

FARNBOROUGH IN PROSPECT

THOUGH a complete list of the new aircraft to be demonstrated or exhibited at the S.B.A.C. Display next month is not, of course, available, it can be said that the flying test-beds will include two for turboprops—the Proteus-Ambassador and Eland-Varsity—and three Canberras, each with different power units. Among the newcomers will be the de Havilland Comet III, Supermarine Type 525 and, it is hoped, the English Electric P.1. A demonstration by five Javelins will be one of the more spectacular items.

THE SALMON AND THE TIGER

FIGHTERS for the U.S. Navy are prominent in the week's news. One—the vertical take-off Lockheed XFV-1—has been named the Salmon, presumably with its leaping propensities in mind, but also, no doubt, in honour of its pilot, Herman ("Fish") Salmon. The U.S. Navy has recently disclosed that the Salmon has taken off horizontally and then maintained itself almost vertically, and nearly still, for periods of several seconds on several occasions. It is also learned that Convair's XFY-1 delta-wing V.T.O. has been trying vertical take-offs, and rose 150ft a few days ago before backing down to land on its tail.

A more conventional fighter, the Grumman F9F-9 Tiger, is claimed to be capable of supersonic speed in level flight at "about 50,000ft, down to sea level," and is described as having a "wasp waist." Notes and a picture appear on page 195.

U.K.-CANADA TRADE DIRECTORY

LAST year, CABMA—The Canadian Association of British Manufacturers and Agencies, which has as its sole purpose the development of British trade with Canada—collaborated with Iliffe and Sons, Ltd., and Kelly's Directories, Ltd., by co-operating in the preparation of a directory of British manufacturers and exporters whose products and services are available in the Canadian market.

The 1954-55 edition of this directory—the *CABMA Register**—is now available. In its 780 7in by 9in pages it gives the names and addresses of over 4,500 British firms and 2,750 Canadian distributors; and the British firms' products are listed under no fewer than 3,750 separate headings. The six main sections comprise a buyers' guide (classification of firms by products); French glossary; alphabetical directory of firms; announcements by Canadian distributors and associated companies of U.K. firms; proprietary names; and trade marks.

One of the major changes in the new edition has been the inclusion of displayed announcements in the "manufacturers and distributors" section, thus saving the reader the necessity for cross-reference to another section.

* *"CABMA Register 1954-55 of British Products and Canadian Distributors." Published jointly by Kelly's Directories, Ltd., and Iliffe and Sons, Ltd. (Dorset House, Stamford Street, London, S.E.1), for the Canadian Association of British Manufacturers and Agencies. Price 42s.; by post, 44s.*

SKYHOOKS AIRBORNE: As related on page 197, both the U.S. Navy's vertical take-off fighter prototypes have now risen vertically under their own power in free flight. These photographs show the Lockheed XFV-1 Salmon (above) taking off horizontally from its special undercarriage and the Convair XFY-1 (right) rising in a true vertical take-off. Both have Allison double turboprops

HERE AND THERE

Handling a B-47

FIRST aviation writer of any nationality privileged to pilot a B-47 is the Editor of *Flight*. During his recent visit to the United States he participated in an acceptance flight from the Boeing airfield, and in next week's issue he will give his impressions of handling one of these famous six-jet bombers.

Fast to Copenhagen

NOWADAYS most European airline records are set up by Viscounts. An exception occurred on August 4th, when a scheduled S.A.S. flight from London to Copenhagen achieved an unofficial record time of 1 hr 49 min: ground speed, 308 kt (354 m.p.h.). The aircraft, assisted by a 40-knot wind at 17,000ft, was DC-6 OY-KLY *Alf Viking*; in command was Capt. Rudenskjoeld.

New Guinea's Defence

THE first of a chain of airstrips being constructed in North and North-West Dutch New Guinea was recently opened. The Dutch Defence Ministry states that these strips are intended for civil purposes. Defence in the area is to become the responsibility of the Royal Netherlands Navy, and Dutch naval forces stationed in New Guinea—mostly at Biak—comprise two frigates, a number of landing craft, a survey vessel and detachments of Marines. A single squadron of naval Catalinas is divided between Biak and Doom, at the western end of the vast and largely unexplored territory.

Miniature Farnborough

AGAIN this year, and to a greater extent, model aircraft will feature in "The Model Engineer Exhibition" to be held at the New Horticultural Hall, Westminster, from August 18th to 28th. Attractions will include tests for jet-propelled model aircraft, flying tethered to a pylon.

Electronic Response Simulator

IN preparation for Farnborough, the Avro research laboratories are being divested of much intriguing equipment, among which is an "electronic response simulator" designed by the company's electronics department. Yet another "tool" for the use of the aerodynamics department, it indicates on a cathode-ray tube the response of an aircraft to any force which may disturb it from stable flight.

Chance for the Fair Sex

THE Women's Engineering Society, who administer the Amy Johnson Memorial Fund on behalf of its sponsors, are offering an open scholarship to the value of £150 to assist a woman holder of a Private Pilot's Licence to qualify for an Assistant Instructor's Certificate. Selection will be made by an interviewing committee. Further details are obtainable from the secretary of the scholarship committee, Miss I. J. Ferguson, 104 Holden Road, London, N.12.

At the Radio Show

IN connection with the Radio Show, opening on August 25th at Olympia, London, *Wireless World* will be publishing two special numbers, a show guide on August 23rd and a review number (including a complete survey of TV and sound receivers) on September 27th.

Helicopter Evening

THE Helicopter Association of Great Britain is holding its eighth annual dinner in London on September 9th. As usual a lecture and film will precede the dinner, the lecturer this year being Mr. Knute Flint of Bahamas Helicopters, Ltd., who will speak on "Helicopter Contracting." Non-members may obtain tickets (price 30s) from the secretary of the Association at 4, The Sanctuary, London, S.W.1.

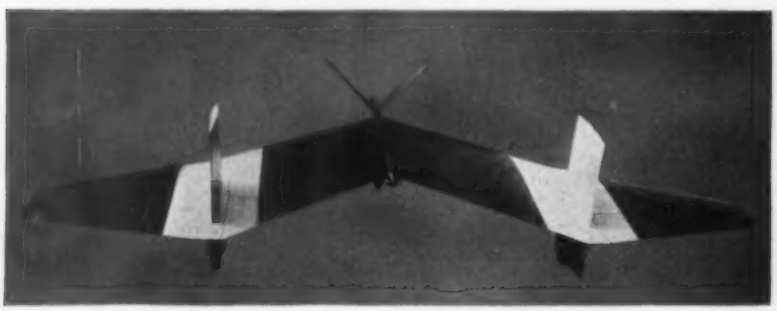
Big and Little Circles

TWO contrasting types of unusual air cargo have recently been carried by British operators. A Silver City Airways Bristol Freighter carried a main engine wheel for an oil tanker from Newcastle to Hamburg; weighing over a ton, it was 8ft. 6in. in diameter and had to be cradled diagonally in the hold. Skyways, Ltd., flew 7½ tons of Persian caviar from Teheran for distribution to various airports in Europe; the value of this cargo was some £75,000.

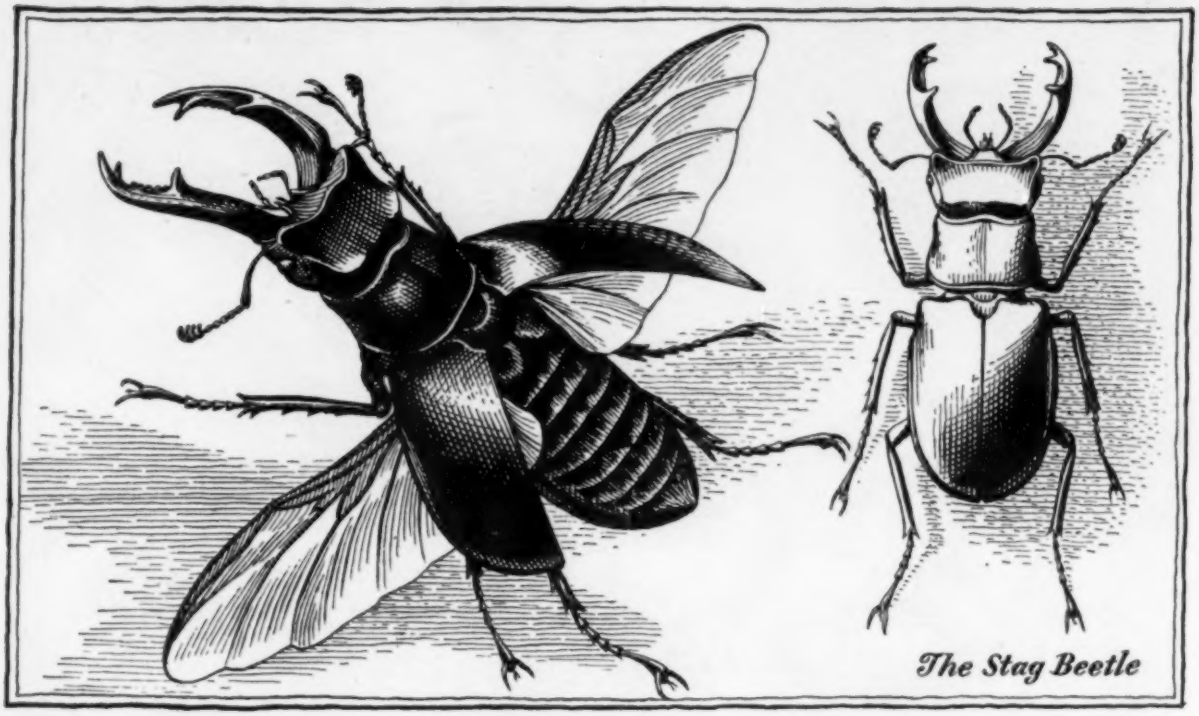
Disaster Averted

THE occupants of an Air France Super Constellation had a remarkable escape when the aircraft forced-landed in a field at Preston, Connecticut, on August 3rd, though two crew-members and ten passengers received injuries. Fire broke out as the 37 occupants evacuated the aircraft, which was completely destroyed. Flying direct from Paris to New York, the Super Constellation was diverted from Idlewild after an hour's stacking and—it was reported—a missed approach, but ran out of fuel *en route* to the diversion airport.

TARGET FOR TOMORROW: This bat-like towed target glider, at present undergoing trials at Boscombe Down, was designed by Professor E. J. Richards, M.A., B.Sc., F.R.Ae.S., of Southampton University. It was manufactured by Brooklands Aviation, Ltd., of Sywell Aerodrome, Northampton, and will be exhibited at Farnborough next month.

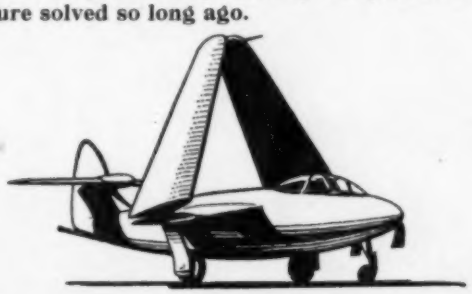


Problems of flight



FOLDING WINGS

Folding wings have been used by beetles since evolution was young. Man, in the carrier-based aircraft, has faced only recently the problem that Nature solved so long ago.



There are nearly as many different reasons for folding wings as there are different kinds of beetle — and beetles, with their 250,000 species, are the largest order in the animal kingdom. Their habits vary widely. Some no longer fly; some never did. Those that do have heavier bodies than any other flying insect, because of their thick plates of protective armour. (Some also have enormous jaws: those of the male stag-beetle illustrated may be for fighting other males during the mating season, or perhaps for scraping plant-shoots to get at the sap.)

This great weight demands large wings. Hence Nature's problem. For many beetles burrow into the earth; many fight; many find their food or their

safety in cracks in wood or chinks in stone. Unfolded wings would make all this impossible. And the beetle's wings are fragile. To keep himself airworthy he has to protect them under armoured covers. (These covers are actually his fore-wings, specially adapted for this special task.)

As in the crowded turmoil of the insect world, so in the tight space of an aircraft carrier. Man has taken yet another leaf out of Nature's great book—has found to yet another of his problems another time-honoured answer.

Pilots whose planes do not need the refinement of folding wings—because they land them at any of Britain's airfields—value the excellent and helpful service of the Shell and BP Aviation Service.

SHELL and BP AVIATION SERVICE

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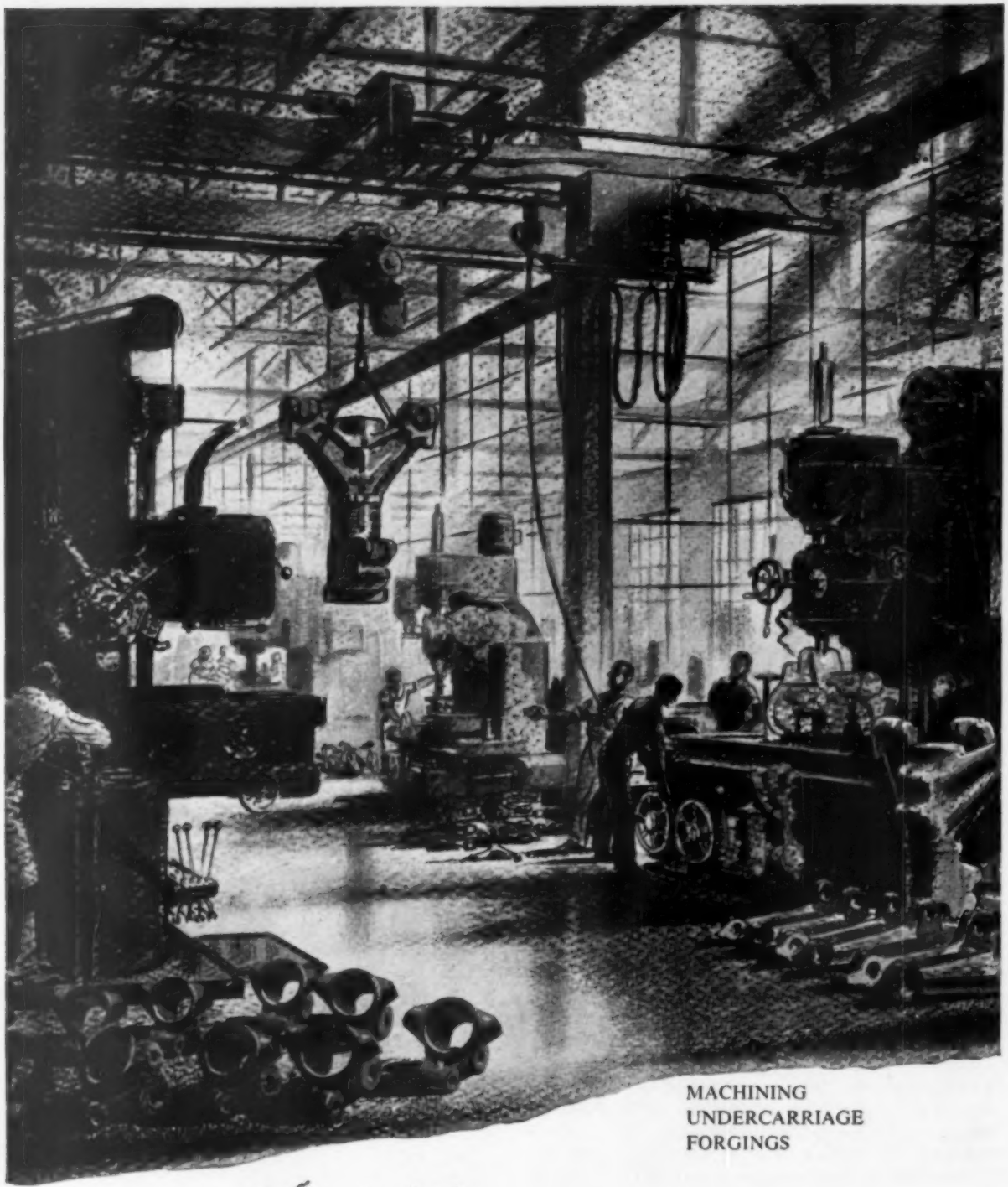

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FAR-NORTH EXERCISE

With the R.A.F. Flying College Hastings Towards the North Geographic Pole

By FRANK BESWICK, M.P.

THE mission set for the detachment from the Royal Air Force Flying College was to carry out flights from Bodö in Northern Norway to the maximum radius of action towards the North Geographic Pole; the general purpose was to gain experience and give instruction in the peculiar problems of high-latitude navigation. Two Hastings Mk 2 aircraft were detailed for the operation, which was under the command of the Commandant of the College—A. Cdre. G. A. Walker, C.B.E., D.S.O., D.F.C., A.D.C.

I had an invitation to join this operation as a passenger and, needless to say, I jumped at the opportunity. The chance of moving into the R.A.F. atmosphere again, of watching the organization (for which I am now called upon to vote substantial sums of money) tackle a quite notable task, was something not lightly to be missed.

The two crews, the students, and the passenger were briefed at Manby on the matter of survival in the Arctic. There were three principal contingencies (said S/L. W. E. Hasson, the M.O.) against which provision must be made: (1) ditching in the open sea; (2) forced landing on either Spitzbergen or Greenland; and (2) a forced arrival on the pack-ice.

The normal drills applied to these different eventualities; in either of the first two circumstances speedy rescue might reasonably be anticipated, but in the third case, because of fogs and the unsuitable landing surface offered by the summer pack-ice, it was suggested that we should immediately start walking south. The precedent of Nansen was quoted as proof of the possibility of making progress on the pack-ice—and living off the country with the aid of seals and polar-bears. Later, at the actual sight of that forbidding country, we speculated somewhat pessimistically upon the chances of repeating Nansen's epic.

However, the range of survival equipment issued generated confidence. From string vests and massive boots to snow whisks, an imposing parka and an anti-mosquito hat, everything conceivable seemed there for personal comfort (comfort, of course, being a comparative quality).

LAST month two Hastings aircraft of the Royal Air Force Flying College, Manby, carried out a high-latitude navigation exercise in the Arctic. In one of them, as a passenger, was Mr. Frank Beswick; in this special article for "Flight" he gives a vivid description of the grim terrain over which the aircraft flew, and also pays a tribute to R.A.F. navigational skill. In the picture above, the author is seen before take-off with A. Cdre. G. A. Walker, Commandant of the College, who flew as second pilot in one of the aircraft and directed the exercise.

We took off from Manby on schedule and without fuss. There was air commodore's weather to Bodö; a forecast occlusion had conveniently disappeared.

Bodö, south of Narvik and just north of the Arctic circle, proved to have new and excellent runways, but there was plenty of high ground around and only one good approach. It also had some most generous, helpful and hospitable members of the Royal Norwegian Air Force.

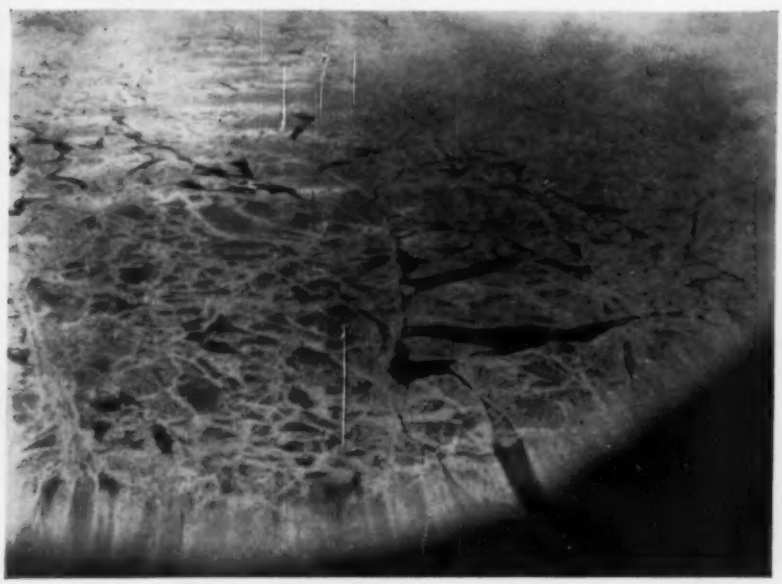
By one of those infuriating processes not entirely unknown in Service administration, the arrival details in the signals carefully despatched from Manby some days earlier had not reached Bodö until the morning we landed. Nevertheless, despite the understandably limited facilities around that northern airfield all necessary arrangements were made for everyone and everything concerned.

It is good to think that the fact that the C.O., Lt-Col. M. Gran, D.F.C., had served in England during the war with No. 331 Sqn., and that Maj. Stenwig, D.F.C., had operated with Nos. 72 and 35, had much to do with the readiness with which requirements were met. We were also entertained most generously by Maj-Gen. O. Bull, the commander of Air Forces in Northern Norway, who had himself founded, in England, Nos. 331 and 332 Squadrons. I must also mention Capt. Bryne, the station padre, who was incredibly obliging even about such non-spiritual but important items as transport or refreshments at the most inconvenient hours.

From the British point of view, even had the mission got no farther than Bodö, I should have declared it worth while as helping to consolidate good Anglo-Norwegian relations. However, the ultimate objective was nothing more southerly than 90 deg. N.

The first Hastings directed to this objective was captained by W/C. A. H. Humphrey, O.B.E., D.F.C., A.F.C., with A. Cdre. Walker, the Detachment Commander, as second pilot. S/L. D. Bower, M.B.E., was the staff navigator, F/L. W. G. Gray the signaller and Sgt. Shout the flight engineer, whilst S. A/C. Sandle was detailed (or maybe, I should say, had volunteered) as quartermaster for the trip.

W/C. S. B. Grant, D.F.C., captained the second



"Pack-ice . . . big slabs and little slabs, of all sizes and wonderful shapes. Between . . . were streaks of black ocean."

(Above) "Black razor-backed ridges, great grey glaciers, and even the white sweeps of beautiful snow between the ridges, are scarcely the stuff on which successful forced landings are made." (Right) This signpost was erected at Bodö by S.A.S., who have made exploratory airline flights over the Arctic.

Hastings, with W/C. M. D. Lyne, A.F.C., as second pilot, F/L. F. R. Wood as navigator, F/Sgt. R. Evans as signaller and Sgt. F. Bartrum as flight engineer.

Five students from the College, Lt-Col. C. A. North, U.S.A.F., S/L. D. Clare, D.F.C., S/L. M. C. Bunting, M.B.E., S/L. G. Sproates, and S/L. J. E. Tipton, D.F.C, were each to make one polar flight as navigators. Besides S/L. White, D.F.C., and myself the passenger list was made up of the senior met. officer from Bodö. This latter arrangement was held by all to be an admirable guarantee of the accuracy of the forecasts.

Conditions given for the first flight were, in fact, reasonably good. Some low cloud was forecast from Norway to Spitzbergen, with a weak occlusion coming in from the west and higher cloud between Spitzbergen and the Pole. Winds from the west should have given a tail-wind component for the first part of the outward flight, veering to a slight head-wind after Spitzbergen, but in no case were quoted at greater strength than 20 kt. To what extent the same winds could be relied upon for the return journey, and whether it might be better to be favoured going north and pay for it after the turn-round or *vice-versa*, made up a nice problem for consideration.

On test the endurance of the Hastings had been 15 hr 20 min, this leaving 220 gal of fuel showing on the gauges. For the purpose of this flight the endurance was accepted as 15 hr with a reserve of approximately 300 gal. The flight plan, from Bodö to 90 deg N and back, proved to be 14 hr 40 min. The margins, therefore, were not excessive. Whatever other variable factors there might be it was clearly an occasion for impeccable navigation. In the high latitudes the specialist navigator re-enters into his own.

In our aircraft S/L. Bower and S/L. Sproates applied themselves to the grid charts and the calculations of pressure-pattern lines and sun shots with absolutely complete devotion. In these more esoteric fields of navigation I claim no knowledge; I base my right to express an opinion on the remark of the late Mark Twain, who said: "I cannot lay an egg, but I can tell a good from a bad one."

The quality of this particular navigational exercise was proven by results. And it was not only a matter of skill; to work without break for around 15 hours, with continual climbing into the astrodome, in an unpressurized aircraft at 9,000ft with only an occasional whiff of oxygen, is in itself no mean effort. The 9,000ft operating altitude was selected not only as suitable to weather conditions, but because it gave best results on the radio altimeter for pressure-pattern purposes.

After Northern Norway we flew over one vast undulating sheet of strato-cumulus. It was unbroken until south Spitzbergen, where two ridges rose out of the cloud, rather like the silhouette of a half-starved Bactrian camel.

Above Spitzbergen the cloud ultimately broke and we were able to meditate upon what must be some of the least hospitable terrain disclosed to aviators. Black razor-backed ridges, great grey glaciers, and even the white sweeps of beautiful snow between the ridges, are scarcely the stuff on which successful forced landings were made. I was interested to learn (later in the mess) that each of the pilots, privately and separately, had decided that, if it came to the point of forced landing at Spitzbergen, they would have opted to put their machine down in a fiord.

However, Spitzbergen did provide a pinpoint. The grid heading was altered from 344 deg to 348 deg. From this position to the next pinpoint on Spitzbergen after the turn round at 90 deg N (and that meant after 1,380 miles, flying over ocean and ice), the necessary correction was only another 3 deg on the grid heading to bring us precisely upon track! With all conventional radio aids that would have been nothing exceptional. In polar conditions, I suggest, this is a remarkable tribute to R.A.F. Flying College standards.

After Spitzbergen there was ice—pack-ice; big slabs and little slabs of it, of all sizes and wonderful shapes. Some slabs were maybe tens of miles across, and some a matter of a hundred yards. Some, smooth and flat, reflected the brilliant sunshine, and others, piled up in the restless movement of the packs, must have presented a most rugged surface. Between these ice floes were streaks of black ocean. Here and there, upon some of the ice-floes, were pools of exciting colour—a translucent blue with an exotic green tinge; an effect, I understand, of the clear fresh water melted from old sea ice.

About half an hour from the estimated position of the Pole we

Crew-members pose for a snapshot at Bodö.

FAR-NORTH EXERCISE . . .

flew into strato-cumulus and ice formed quickly. W/C. Humphrey decided to climb to 11,000ft. At 1103 hr, when we levelled out in bright sunshine again, we had been flying for 7 hr 23 min—a fraction over half the total flight-plan time. We were by then near, but not on, the point we had set out to reach. The time/fuel graph (or "how-goes-it chart," or whatever they call it) showed rather better fuel consumption than calculated. Conditions for the return at Bodö were confidently forecast as good. Bardufoss, the alternative, was 100 miles farther north. The decision was to press on.

Douglas Bower took one sun shot after the other; the position-lines were scrupulously marked across the track by Sproates. Humphrey concentrated on his instruments. A. Cdre. Walker encouraged everyone with his benevolently confident smile. Unperturbed by the increasingly expectant atmosphere, Bower steadily took his sights until finally the signal was given. We were over the North Pole.

The situation outside seemed much the same as for hundreds of miles around; but it was the objective they had set out to secure. A mead of satisfaction was justified. Our efficient acting-quarter-master, S.A/C. Sandle, shook hands triumphantly with the beaming Sgt Shout; "Gus" Walker congratulated all concerned; Allen Humphrey turned the aircraft round; and the navigators settled down to work out their sums all over again.

We turned over the Pole at 1125 hr after 7 hr 45 min flying; and we had used 100 gal of fuel less than scheduled.

A favourable wind-component for the return journey might on balance reasonably have been expected. In the event it was not quite the case. South of Spitzbergen the winds had backed and for a time were 180 deg; though by Bodö they were down to light and variable again.

W/C. Humphrey made a classic three-point landing with the Hastings after 15 hr 28 min, having flown over 2,720 n. miles. The No. 2 Hastings, which had taken off first, had landed some minutes before us, having also made 90 deg N. We actually had it in sight until Spitzbergen on the flight north.

The following day (and the sun not having set between times) the two aircraft set out again. No. 1, captained by Humphrey, turned round at 89 deg 40 min, and No. 2, under Grant, turned round at 88 deg 20 min. On this occasion the final touch of achievement was not added; the major purpose of the exercise was secured, but, in view of the less favourable conditions and the efforts of the previous day, these two flights were also noteworthy.

This loading-up scene, with the crew not yet in flying kit, has an oddly unadventurous and matter-of-fact air—suggestive, perhaps, of a squadron sports team about to leave for an "away" match.

The impressions I retain include the following:—

The fact that the "frozen north" was barely freezing—having an estimated surface-temperature at the Pole of 0 deg C.

The reliability of the Hastings—and the quality of their maintenance. Total snags on the two machines after the first flight amounted to one blocked starboard urinal due to someone trying to pour the dregs of cold soup upon the pack-ice.

The fussless precision with which the whole operation was carried out.

And, besides the efficiency, the excellent spirit and friendliness of the R.A.F. Flying College detachment under its Commandant—though, frankly, I should imagine it difficult to contrive anything other than a good spirit under "Gus" Walker.

The entire operation must have been accounted completely satisfactory. To those responsible there must have been a sense of especial satisfaction. That part of the world over which we flew, with its strange beauty and its potential cruelty, may well prove to be, in war or peace, one of the major air routes of the globe. To me, the opportunity of seeing it was a great experience for which I was deeply grateful.

THOSE £25,000 BOMBER PILOTS

IN a Parliamentary written answer on July 28th, the Under-Secretary of State for Air gave details showing how he arrived at the figure of £25,000—given in reply to a question the previous week—for the cost of training individual bomber pilots.

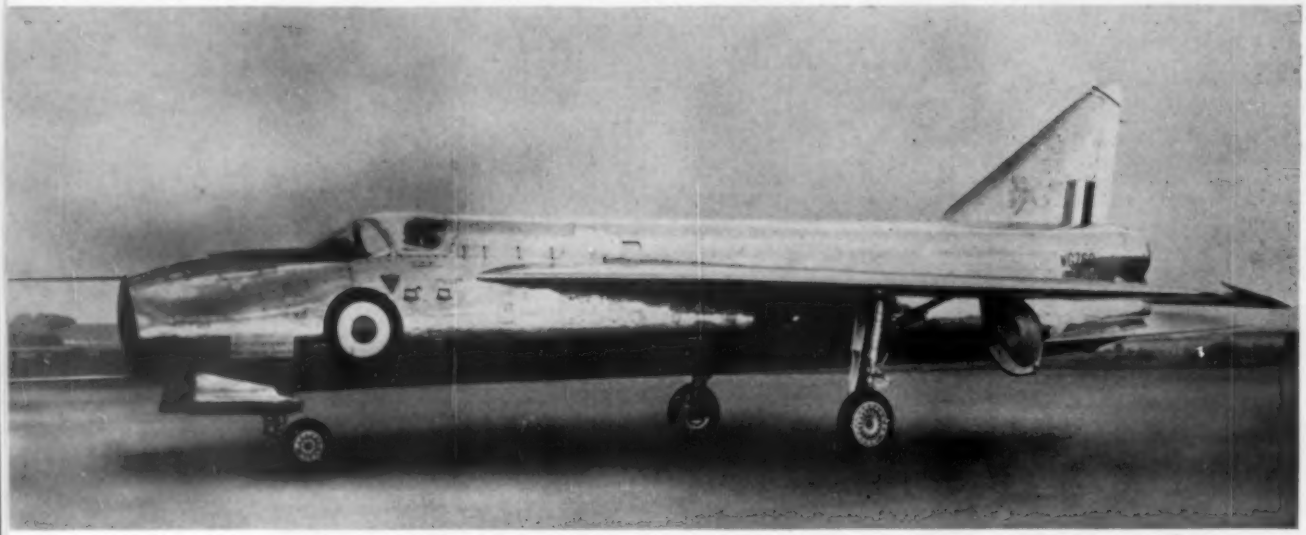
Mr. Ward said that the figure represented the average cost of training pilots for jet- or piston-engined bombers up to the time they joined a squadron.

The training was divided into four stages: initial training school, flying training school, advanced flying school, and operational conversion unit. The second of these stages included 200 hours' flying on preliminary types of aircraft, the third stage 50 to 60 hours on advanced types, and the fourth stage from 60 to 85 hours on the operational type the pilot was to fly when he joined a squadron. The training, therefore, required from 310 to 345 hours' flying, much of which was on heavy types of aircraft, and more than half the total cost was accounted for by the capital and direct operating costs of the aircraft.

The approximate cost of each of the stages was as follows: Initial training school, £300; flying training school, £8,500; advanced flying school, £8,500; operational conversion unit, £8,000.

These figures, said Mr. Ward, were arrived at by apportioning the total cost of the schools between the successful pilots, so that they included an element to cover the nugatory expenditure on the unsuccessful pupils.

BABY POWER-STATION: Two views—one in the "installed" state—of the Solar Mars T-41M gas turbine now being installed to provide auxiliary power in U.S.A.F. C-124C transports; one of these little units recently completed 500 hours' service without overhaul. Running on the aircraft fuel at 36,000 r.p.m., the T-41M generates a continuous output of 14kW (max. 17.5kW); it weighs 230 lb with generator, controls, etc., and turbine bare weight is 60 lb. An article on the possibilities of gas-turbine auxiliary-power units appears on page 211 of this issue.



SUPERSONIC INTERCEPTER

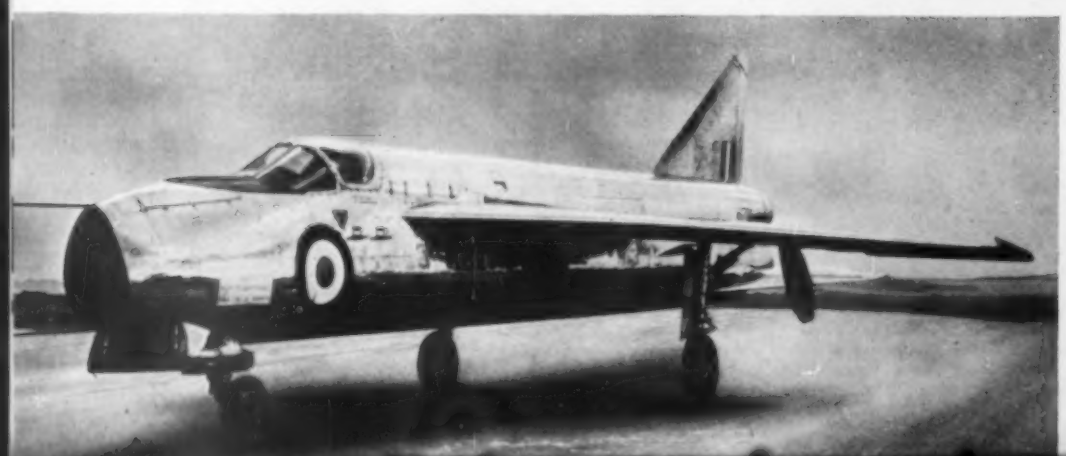
Twin-Sapphire English Electric P.1 Flies at Boscombe Down

DESIGNED to be easily capable of supersonic speed in level flight, the English Electric P.1 single-seat intercepter fighter prototype WG760, powered with two Armstrong Siddeley Sapphire turbojets, made its first flight at the Aeroplane and Armament Experimental Establishment, Boscombe Down, on August 4th. The pilot was W/C. R. P. Beamont, D.S.O., O.B.E., D.F.C., who reported that the flight had been "remarkably pleasant and free from incident." He is also on record as having said, "It's a peach. Many people have thought that the supersonic design might make the fighter hard to handle at low speeds. In fact, it handled beautifully and gave no trouble at all."

At this stage no technical information may be published other than that which can be gathered from the officially issued photographs on this page. However, the resemblance of the P.1 to the Short S.B.5 research aircraft, also depicted, is far too marked to be merely coincidental. Note especially the curious formation of the P.1s leading edge, and a similar, though more pronounced, characteristic of the Short. The low-set tailplane and undercarriage disposition also correspond. Fighter pilots will note that the cockpit enclosure does not afford rear vision. Technicians will observe the contour of the nose-mounted air intake (a favourable location for supersonic flight), will muse on the internal ducting arrangements for the Sapphires, and will note, too, that the intake is of plain, open-mouth, form, lacking the central "bullet," now considered essential for efficient operation at Mach numbers over 1.3 or so. As for the spotters, they will instantly remark that not only the rear fuselage, with its superimposed tailpipes, but the shape of the vertical tail surfaces, and—more especially—the attachment of the tailplane to the bottom of the fuselage, are very strongly reminiscent of France's S.E.2410 Grognard.

The original photographs show that the inscription on the nose of the fuselage is a warning to keep clear of the intakes when the engines are running. Adjacent arrows point fore and aft, the rear one indicating intake doors partly covered by roundels. The main undercarriage appears to retract outwards and rearwards, and the nosewheel forwards. Both views of the aircraft have been so retouched that actual ground shadow—and consequently wing planform—is not disclosed; but again the reader is invited to examine the "bird's-eye" view of the Short S.B.5 and form his own conclusions. Obviously the ailerons are horn-balanced. The model, seen in the group photograph, exhibits a small fairing—which may be a parachute housing—between the tailpipes.

The design of the P.1 necessitated a wide range of the most modern test equipment, which was planned and constructed by the English Electric Company itself and included a transonic wind tunnel—the first of its type to be built in England. The



Comparative views of the English Electric P.1 supersonic intercepter prototype (left) and the Short S.B.5 low-speed research aircraft (above). That design features of the English Electric machine were tried out on the Short can hardly be doubted after examining these pictures, although no official acknowledgement of the fact has been made.

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Left to right, leaders of the P.1 team, in the persons of Mr. W. Shorrock, M.B.E., manager of the Preston works of the English Electric Co., Ltd., W/C. R. P. Beamont, D.S.O., O.B.E., D.F.C., chief test pilot, and Mr. F. W. Page, B.A., F.R.Ae.S., chief engineer of the English Electric aircraft division. The right-hand view shows the plan-form of the Short S.B.5 wing and the arrangement of the ailerons.

SUPERSONIC INTERCEPTER . . .

technical team was led by Mr. F. W. Page, B.A., F.R.Ae.S., chief engineer of the company's aircraft division at Warton, Lancashire. Though certainly aware of the existence of the Supermarine 525, Mr. Page nevertheless claims that the P.1 is the first aircraft built in Britain which has been designed to fly at supersonic speed in level flight. "With the P.1," he says, "we shall have to undertake the full range of flight testing at both transonic and supersonic speeds as well as subsonic speeds. This will mean that the period during which the aircraft is under test will tend to be even longer than has been usual in the past."

When informed of the maiden flight Mr. Duncan Sandys, Minister of Supply, said that some 20 pre-production P.1s had been ordered for development trials. This, he said, would make it possible to carry out many of the flying and equipment tests concurrently, and would shorten the development period. He added that several other supersonic fighters were in process of construction and would be flying before long.

As no name has yet been officially approved for the new intercepter, we offer—together with our congratulations to all concerned—these suggestions: Arrow, Assegai, Fiend, Wraith, Terror, Excalibur, Champion, Strongbow, Crossbow, Virago, Warrior, Paladin.

"CRASH PROGRAMME" FOR U.S.A.F.

THE United States Air Force has served notice on American aircraft designers that it wants a "crash programme" to speed up delivery of improved combat aircraft by the late 1950s. Mr. Roger Lewis, the Assistant Air Secretary, has said that sufficient of current-type aircraft have already been ordered to complete the 137-wing build-up by mid-1957, and that the next big build-up must imperatively involve "really big technological advances." He repeated earlier predictions that U.S. aircraft production would fall to about half its present 8,000-aircraft-a-year level in 2½ years after the 137-wing build-up is complete. He made it clear that the emphasis in future would be on quality and not on numbers, and implied that no more of even the best types at present in service use are likely to be ordered.

Mr. Lewis issued a statement explaining why there were delays in the past year in contracting for new aircraft. The Air Force, he said, had an "unobligated carry-over" of $4,500 million (£1,607,142,000) in the aircraft procurement funds when the fiscal year 1954 ended on June 30th last, whereas it had expected to carry over only $1,650 million (£589,285,000). The slower rate of placing orders, he said, was made possible by "sounder procurement practices both in methods of contracting and in timing of orders," adding that the average time taken to build an aircraft had been cut from 21 months to 18 months. He reported that the Air Force ordered $3,700 million (£1,321,428,000) worth of aircraft in the fiscal year 1954, but cancelled orders for $2,000 million (£714,285,000) worth of airframes, power plants and related equipment. Of these cancellations about 40 per cent concerned power plants; the remainder affected Beech T-36 and Boeing B-47 trainers.

SPRAYING ON THE GRAND SCALE

EARLY last year we gave news of the serious situation which was developing in New Brunswick, Canada, where some 5,000 square miles of fir and spruce forests supplying timber for manufacturing paper and many other products was threatened by the pest known as budworm. A major aerial spraying offensive against the danger was then in preparation.

Now comes news of the end of the operation, with results that are believed to have been highly successful. In New Brunswick a fleet of 42 aircraft operating from five aerodromes sprayed over one million acres of woodland. In Eastern Quebec, where woods were also threatened, another 14 aircraft operating from two airfields sprayed some 300,000 acres. Officials have indicated that the operation promises to have been in some respects the most successful since the first project of the kind was launched in 1952. Favourable weather made it possible to conclude the spraying earlier than expected, and the insect was hit at the most vulnerable stage in its development; it was found possible, also, to treat the trees at the most effective stage, i.e., when the buds were opening.

During the past three seasons over 5,000 square miles of woodland have been treated in New Brunswick and over 300 in Quebec. An extensive aerial and ground survey is now in hand in order that the results of the operations may be accurately assessed.

In New Brunswick, the cost of the spraying is shared by the province of New Brunswick, the Federal Government, and four pulp and paper companies. In Quebec, the Provincial Government pays half the cost, while the other half is paid jointly by three wood-using companies. The 56 aircraft used in the latest operations were supplied by Wheeler Airlines, Ltd., of St. Jovite, P.Q.

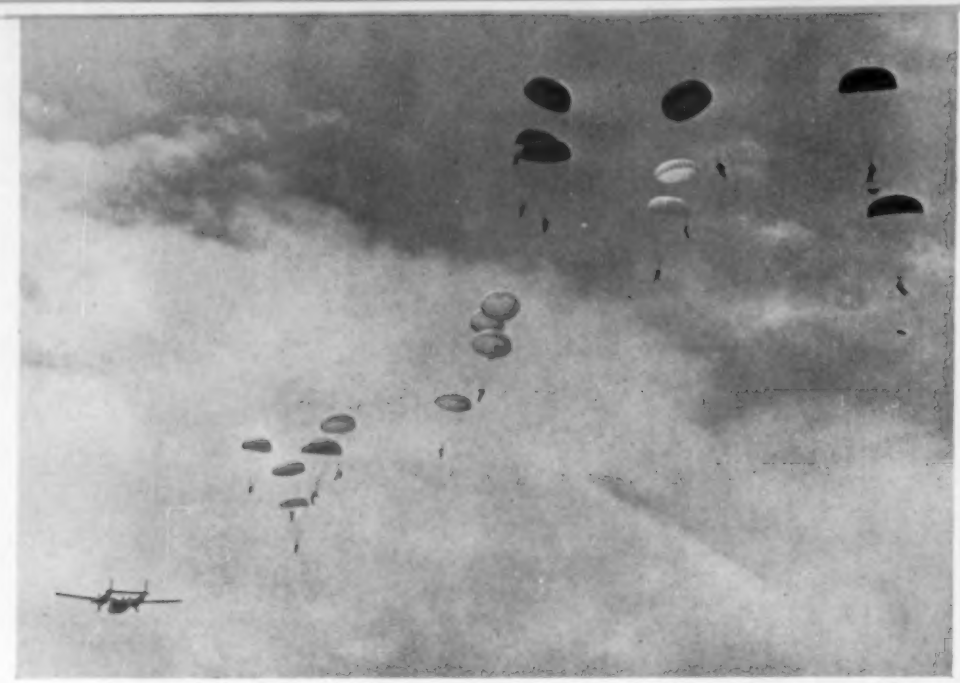
LECTURES ON AIR LAW

UNIVERSITY COLLEGE, London, has received a number of inquiries as to whether, in addition to the existing introductory one-year course on International and Comparative Air Law for non-degree students, an additional and more specialized course could be established for those who have completed the general course. The Faculty of Laws has accordingly decided to meet this demand by establishing an additional second-year course.

As at present, the first-year course will deal with general principles, but the new course will cover selected problems on a more advanced level. Although the second-year study is primarily intended for students who have completed the first-year course, each forms an integral series of lectures which may be taken separately.

There will be one 1½-hour lecture a week for each course. The time of the lectures for the first-year course has been fixed for 7 p.m. on Tuesdays, and the series will begin on October 12th. The second-year course, beginning on October 13th, will have lectures at 7 p.m. on Wednesdays.

Persons who are not regular students of the College will be admitted to these courses. The fee for each is £5 5s per session, and the registration fee on first admission is 10s 6d. Application forms and further particulars are obtainable from the Faculty Office, University College, Gower Street, London, W.C.1, and forms must be returned by September 15th.



"FLIGHT" Photographs

A stick of fully equipped paratroops is dropped from a C-119; among them are a few men from a second stick released by another C-119. A gun-dropping demonstration was less successful, as related below.

AIR SUPPORT DEMONSTRATED

A STIMULATING air display was presented in the Stanford battle area in Norfolk on July 29th to an assembly of Home Guard and Combined Cadet Force units. The purpose of the exercise was to demonstrate the use and effect of various types of air support in modern warfare.

The first event was, therefore, the dropping of a number of paratroops and stores from U.S.A.F. C-119s. A pilot group of three men first jumped to prepare the ground and were followed by two "sticks" of 16 and 20 men respectively, with full equipment. On the fourth run a C-119 with door removed dropped a field gun—literally, as it transpired. The extractor parachute malfunctioned and the gun toppled as it left the hold; as the eight parachutes opened they tore loose from the gun, causing it to drop off its pad and crash to earth with a noise like a distant clap of thunder. The sky was for a minute filled with the drifting debris of parachutes and packing, but half an hour's work with crane and lorries cleared the field for the next event.

This was provided by a single Canberra from Marham, showing its characteristic paces, and a W.S. Dragonfly 3 of No. 705 Sqn., F.A.A., which was very ably demonstrated by Lt. Simpson, R.N.Z.N. A rating was picked out of the ferns, taken for a ride and then returned to his leafy hide. A team of Sabres from No. 441 Sqn., R.C.A.F., North Luffenham, was to have contributed the next item, but, owing to R/T. trouble, only a single aircraft performed. It behaved, however, in the truest Sabre traditions and gave a magnificent demonstration of the manœuvrability at extremely low level including several loops (with slats extended) nearly as tight as those performed by Lt. Kelly in a Sea Hawk.

The *pièce de résistance* was the appearance of a camouflaged production Hunter, with production dive brakes, which showed its Tarquinian paces to the accompaniment of an unearthly shriek of tortured air. (It forms the subject of a pictorial display on page 210 of this issue.) The Hunter seemed to be able to imitate the sound of several Vampires and Sabres at once and pulled "streamers" at the top of each of two consecutive loops. The pilot was S/L. D. H. Seaton, D.F.C., A.F.C., and as he disappeared in a spectacular vertical zoom-climb through cloud, four Venoms, specially summoned from 2nd T.A.F. in Germany, came in to give a demonstration of rocketry and gunnery against the whitewashed hull of a derelict Sherman tank. They zoomed "from the deck" and attacked in a dive in very close line astern—so close that the aim of the last three pilots was evidently disturbed by the proximity of the others. They made two rocket attacks each, and then two with their 20 mm cannon. Here, too, they were closely bunched in the attack and broke away very close to the numerous glowing red ricochets which soared up in front of the last aircraft. It was announced that they were to return to their base in Germany that evening after refuelling at Marham.

Altogether it was an excellent display, much appreciated by the audience; particularly encouraging was the first public appearance of a production Hunter flown by a Service pilot.

(Left) Four R.C.A.F. Sabres from North Luffenham, one of which gave an individual demonstration of low-altitude manoeuvrability. (Right) The Fleet Air Arm W.S. Dragonfly 3 showed the khaki-clad audience some of the tasks which a helicopter can perform. The full Naval colours which it wears show it to be a rescue (as distinct from communications) aircraft. As on other F.A.A. machines, the number indicates its base, type and seating.

Production C-130As are now on the line at the Lockheed factory at Marietta, Georgia — where Boeing B-47s are built. This photograph of the prototype C-130 was taken at the company's main base at Burbank, California, where it will be put through its trials.

LOGISTIC LOCKHEED

The New C-130 Assault Transport Now Ready for Taxying Trials

THE aircraft illustrated above, and also shown in two further photographs on p. 207, is of exceptional interest, not only from the technical viewpoint but also owing to the manner in which it fills a very difficult set of requirements which have never previously been met by a single aircraft type. The genesis of the design has been outlined by Mr. Clarence L. Johnson, chief engineer of Lockheed's California division, in the following terms:

"The Army, which played a big part in setting up requirements for the ship, wanted a plane to carry soldiers, paratroops, patients, and all types of ground force equipment up to and including items weighing 12 to 20 tons. The Air Force wanted a ship that would meet requirements of a tactical airplane. At the same time, the Military Air Transport Command wanted a long-range plane suited primarily for carrying passengers. To make up one set of requirements that would please everyone was quite a task."

From these requirements, the Air Force evolved a truly formidable set of specifications, calling for an aircraft capable of flying at very low speed and altitudes, for para-dropping men and heavy equipment, while at the same time having very great speed and altitude capability for transatlantic or trans-Pacific missions. Johnson commented, "Obviously, by this time, our new airplane was getting to be quite a bag of tricks." By 1952 the company were at work on the specification, in competition with other selected firms.

There were about a dozen engineers and aerodynamicists initially assigned to the project. Mr. Johnson outlines the basic design considerations as follows:—

"First thing we had to decide was what kind of wing we would use, how big, and where should it be placed. Obviously, if we intended loading a bulldozer on our airplane we wouldn't load it up over the top of the wing. That meant that we would need a high wing and that we'd want the engines off the ground to give clear access to the floor of the plane. Further, we wanted that floor to be at exact truck-bed height, 45 inches from the ground, so that when a truck backed up to the plane to unload its cargo, the two floors would be even.

"The high wing presented some problems. The landing gear doesn't go in a high wing very well, particularly when the landing gear is one that must operate in mud, or off grass fields, and therefore must have enormous wheels. In the first place the engines on the C-130 will be so small that the landing gear cannot be retracted into the nacelles. And in the second place the wing is so high off the ground that such landing gear would be too big and too heavy to be practical.

"So we simply took the wheels—two huge wheels on either side, one behind the other—and put them alongside the fuselage. The reason we put one wheel behind the other is that on a muddy field the wheels would have to plough a trench only as wide as one wheel, rather than a double trench. Further, it was easier to enclose the gear in a fairly small bump on the fuselage. The biggest problem with a landing gear of this kind is getting the left and right gears far enough apart so that the ship will not tend to tip over when landing in a stiff wind."

The power units selected for the C-130 are the latest and best of a long line of turboprop developments by the Allison division of General Motors. Designated T56, the new engine develops up to 3,750 h.p. and is notably compact and efficient. Some notes on the engine, and its flight testing in an experimental Constellation, were given in our issue of April 30th last. It has been estimated that the use of the T56 has, in comparison with the best available piston engine, saved the weight of about 40 troops (say, 10,000lb).

Internal comfort has been greatly increased by making the entire fuselage fully pressurized, so enabling casualties to be taken above rough air as well as permitting long-range cruising at economic altitudes. Yet the pressurization had to be made compatible with the enormous rear-loading door, large enough to admit the largest vehicles and stores, which had to be mounted in a sealed frame capable of accepting the in-flight pressure load of some 75 tons.

At low altitude, with cabin-pressure differential zero, this door can be opened to permit the dropping of any kind of stores. Possible loads include a 155mm howitzer with its tractor, or over 100 (the figure is not yet released) troops or litter cases. The cargo floor is integrally stiffened and incorporates a grid system with tie-down devices each with a capacity of from 10,000 to 25,000 lb. The interior is fully air-conditioned and insulated and is warmed by heating the floor.

Mention of the integrally stiffened floor leads us to consider the C-130 structure, which is as remarkable as is the rest of the aircraft. The form of structure was originally employed on the Super Constellation, the bottom wing panel of which is milled from a solid sheet of $1\frac{1}{2}$in duralumin, 40ft long and 40in wide. Big milling machines cut away the excess metal to form a tapered panel of optimum form, devoid of joints or residual stress.

This development was considered advanced when it was introduced, some three years ago, and yet—quoting Johnson again: "In the C-130 we have gone far beyond even this advanced type of construction. The result is a type of construction that allowed us to build an airplane that was very light, very strong and very simple. Rosie the Riveter will have little to do with construction of an airplane like the C-130. But Pete the Machinist will have quite a job. That's because now, instead of taking two small pieces of metal and riveting them together, we take one very large piece of metal and carve out the shape we want in one solid piece that needs no rivet."

The production Lockheed C-130A, which Mr. Johnson describes as "chock full of interesting ideas," is in full production at Marietta, Georgia, for the U.S. Air Force. It is also noteworthy that a U.S.A.F. general recently commented on the immense civil possibilities of the design.

LOCKHEED C-130

Four Allison T56 turboprops driving Curtiss Turbolectric airscrews. Total take-off horsepower, 15,000. Span, 132ft; length, 95ft; height on ground, 38ft; all-up weight, about 130,000 lb; maximum cruising speed, about 400 m.p.h.

CHILTERN AIR RACES

THE arrival of 26 "attacking" aircraft, seven of whom had got through unobserved, signalled the opening of the Bank Holiday rally and race meeting organized by the Vintage Aeroplane Club at Denham on Sunday, August 1st.

After lunch on Sunday, the day was devoted mainly to various tests of pilot skill (balloon-bursting, supply-dropping and formation flying), beginning with an impeccable example of how to burst three balloons in treble-quick time by Capt. Ron Gillman in the Vintage Club's Cadet. Most memorable sight was the ultra-low, ultra-light approach of John Dible in his red Aeronca G-AEVS, who seemingly picked his way between the wings of parked machines to drop his supplies. Demonstrations of the shiny Blackburn B.2 and the agile Auster J.8L (Gipsy Major 10) by Tim Wood and Ranald Porteous were also included in the day's programme.

Main attractions at Denham on the following day, Monday, were the three air races, each over the 17-mile closed circuit Denham - Little Chalfont - Coleshill - Fulmer - Denham. In the morning, the first of these—the Harmel Trophy Race—took place, the ten competing aircraft consisting entirely of Geminis, Messengers and Hawk Trainers. First away was W. H. Bailey in the Elstree Club's Hawk Trainer: at the other end of the handicap list were the Geminis of Bowles, Dunkerley and Nat Somers. The winner was Spiller in his Messenger, followed by Ogilvy (Hawk Trainer), Parker (Messenger), Bowles (Gemini) and Wright (Hawk Trainer). These went forward to the Chiltern Hills Race.

The West London Trophy Race—for Vintage aircraft only—was held after lunch. The line-up included the Blackburn B.2, Cirrus Moth, Spartan Arrow and Avro Cadet as well as Miss Leaf's Hawk Major and Ron Paine's Hawk Speed Six. Gusty conditions favoured the monoplanes, and the first four home were Miss Leaf, Spiller (Leopard Moth), Paine, and Marler (Miles Falcon). Beating the other biplanes into fifth place, however, was W/C. Clem Pike in the Cirrus Moth, which had been first away.

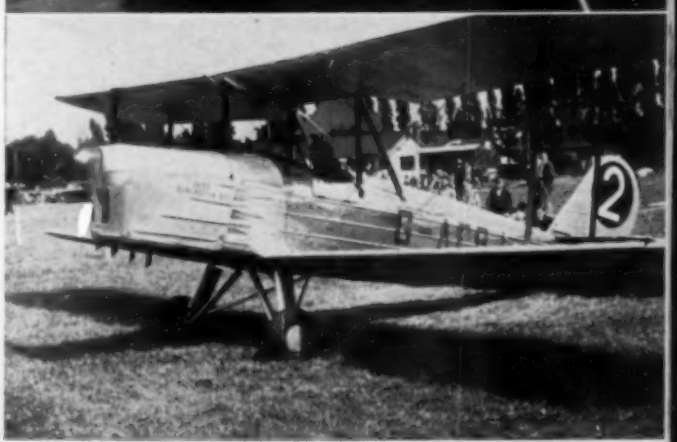
Before the principal event of the day, the Chiltern Hills Trophy Race, there were several distractions. These included demonstrations of alleged radio control over the Avro Cadet (Capt. Gillman piloting the pilotless aicraft); of the Dart Kitten by G/C. Mole; of the formation abilities of the Vintage Club's team (Cirrus Moth, Avro Cadet, Moth Major, Spartan Arrow and Tiger Moth); of the J.8L by the incomparable Porteous; and a most improbable chase by a police-manned, bell-ringing Tipsy after an Auster, from which was dispensed articles of feminine clothing and, eventually, an underclad female.

First machine away in the Chiltern Hills Race was the Cirrus Moth. It was just completing its first circuit as Spiller's Messenger, fourth away, took off. Wright and Ogilvy, close together in their Hawk Trainers, rounded the pylon after their first lap as Marler in his Falcon started and, as scratch-man Paine was finally flagged away (21 min 25 sec after the Cirrus Moth) Miss Leaf's Hawk Major began her second circuit.

Although the field was closing up continuously, it was not until the third lap that there was any change in position. Bowles' Gemini, its undercarriage stuck in the "down" position, then dropped back from seventh to ninth. On the last lap, Miss Leaf was doing well and was leading at the final Fulmer turn, only to be passed on the final leg by the speedy Speed Six. Third was Parker in the "King's Cup 1954" Messenger, followed by Spiller and Marler. The extremely close duel which Ogilvy and Wright had enjoyed in their Hawk Trainers continued right up to the finishing line, which the two passed in almost a dead heat.

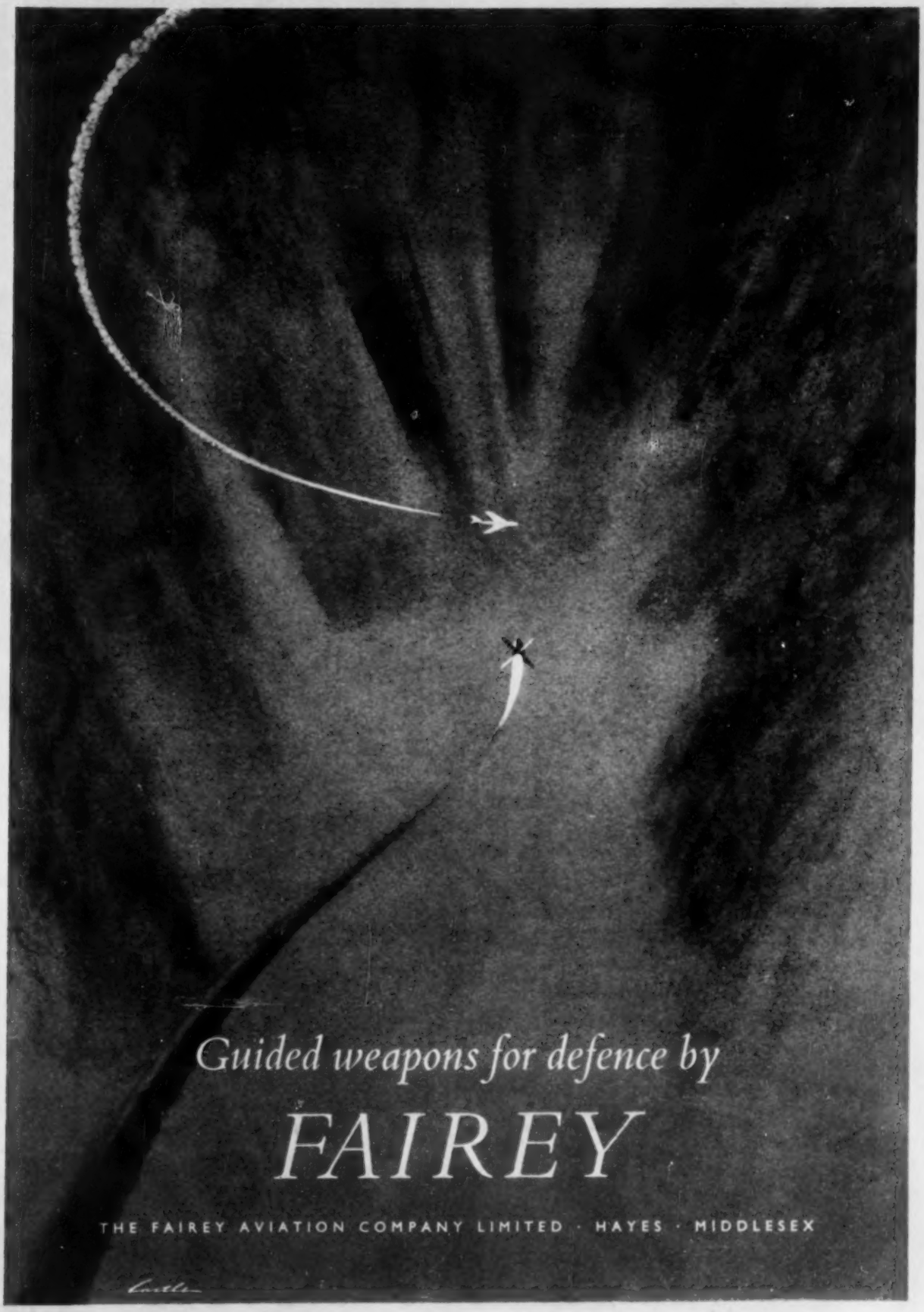
CHILTERN HILLS TROPHY RACE

Place	Pilot, Aircraft and Engine	H'cap Time min sec	Av. Speed m.p.h.
1	R. R. Paine (Hawk Speed Six, Gipsy Six H.C.)	21 25	186.5
2	Miss F. M. Leaf (Hawk Major, Gipsy Major 1)	13 07	135
3	G. R. I. Parker (Messenger 2A, Cirrus Major 3)	11 43	128.5
4	A. J. Spiller (Messenger 2A, Cirrus Major 3)	10 56	125.5
5	G. C. Marler (Falcon Six, Gipsy Six 1)	18 48	164
6	D. F. Ogilvy (Hawk Trainer 3, Gipsy Major 1)	09 26	119
7	D. C. G. Wright (Hawk Trainer 3, Gipsy Major 1)	09 52	120.5
8	C. A. Pike (Cirrus Moth, Cirrus Hermes 2)	00 00	93.0
9	W. P. Bowles (Gemini 1A, 2 Cirrus Minor 2)	14 28	129.5



"Flight" photographs

Scenes at the Chiltern Hills Air Race Meeting: (reading from top to bottom) Ron Paine taxies his Speed Six in after winning the main event; Spiller's smartly-striped Messenger, winner of the Harmel Trophy Race; a low beat-up by the Moth Major (flown by Capt. "Panda" Watson) after the Vintage Club's formation flying; and the Blackburn B.2, being taxied out by Tim Wood prior to his demonstration flight. The Messenger in which Wood won this year's King's Cup Race at Coventry was flown at Denham by "Sailor" Parker.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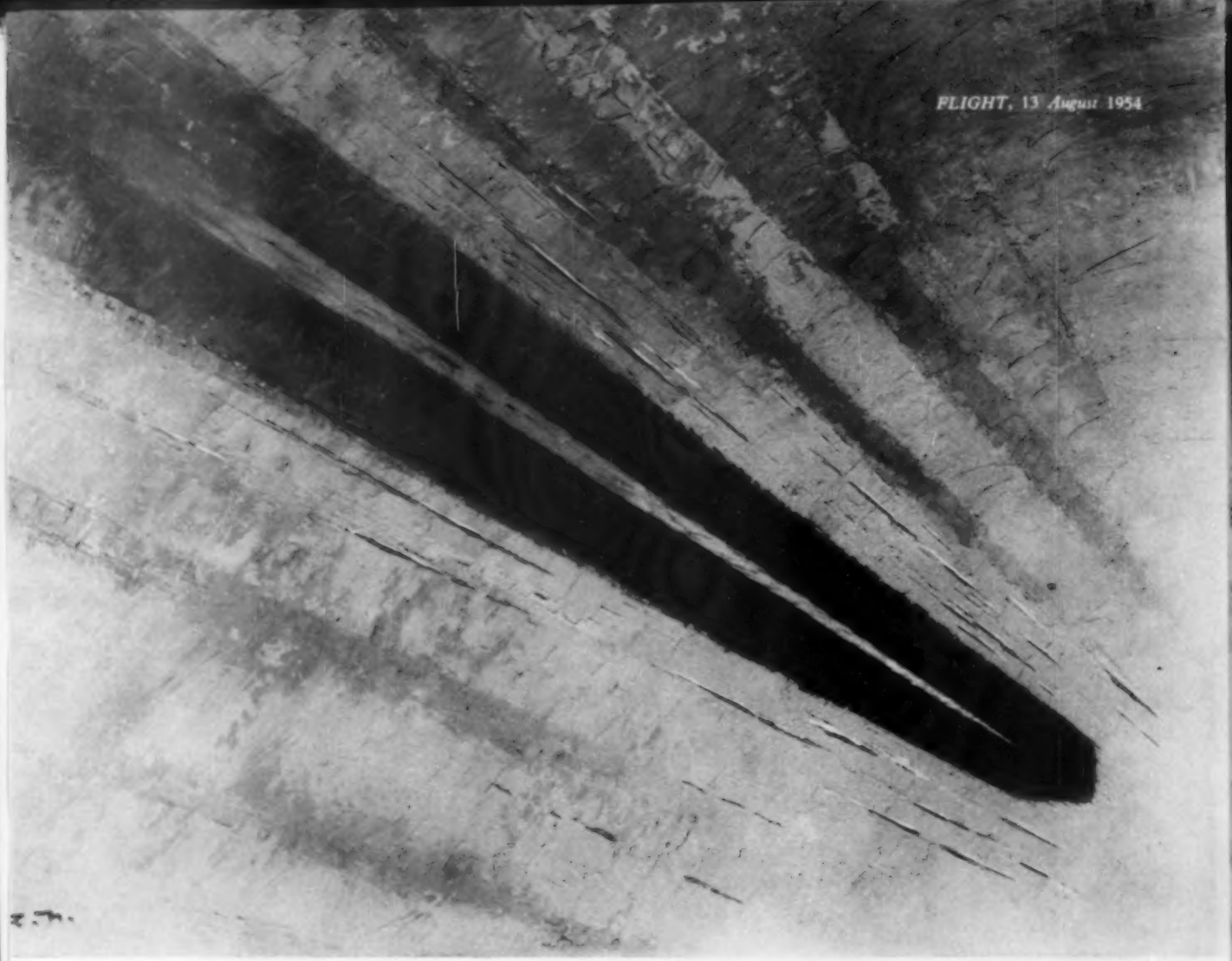


Specially painted for Armstrong Siddeley, Roy Nockolds' abstract design portrays the tremendous power/speed potential of the Sapphire turbojet.

Chosen to power an impressive list of aircraft for the air forces of the N.A.T.O. powers — the Sapphire develops over 8,000 lb. thrust. With its small frontal area, resulting from an annular combustion chamber, the Sapphire blends well into the aerodynamic forms of supersonic aircraft.

★ **THE SAPPHIRE** *is being manufactured under licence by the Wright Aeronautical Division of the Curtiss-Wright Corporation in the U.S.A., where it is known as the Wright J-65.*

The Hawker
HUNTER *F.2 fighter*

The Gloster
JAVELIN *all-weather fighter*

★ *The Republic F.84F*
THUNDERSTREAK *fighter*

The Handley Page
VICTOR *crescent-wing bomber*

★ *The*
MARTIN B57 *(Canberra) bomber*

★ *The North American*
FURY *fighter*

★ *The Douglas A4D*
SKYHAWK *bomber*

ARMSTRONG SIDDELEY

ARMSTRONG SIDDELEY MOTORS LIMITED · COVENTRY
Members of the Hawker Siddeley Group

AIRCRAFT INTELLIGENCE

MULTI-PURPOSE: U.S.A.F. machine No. 33397 is the prototype Lockheed C-130 transport, described on page 205. These photographs show the neat Allison power units, the housing for the main undercarriage outside the pressure hull, the scanner-equipped nose and the extensive window area of the flight deck.

Great Britain

A.S.M. Re-heat Canberra. Although it was modified at Bitteswell as long ago as last year, the existence of a re-heat Sapphire Canberra was not acknowledged by Armstrong Siddeley Motors until the aircraft was flown past the crowd at the National Air Races in June. Numbered WV787, it is a standard B.2 machine, painted in the "interim" uniform of grey/green above and blue below. The Sapphires were originally fitted with fixed-area orifices in order to speed afterburner development, although this results in a poorer take-off performance than that possible with eyelid-type shutters. Armstrong Siddeley also have another Sapphire Canberra, of earlier black-painted vintage.

Folland Midge. In spite of the strictest company security, quite a lot of information regarding Folland light-fighter development has been published, including an actual photograph of the first prototype, which found its way into an Italian journal. Now awaiting its first flight, the Viper-powered FO.139 Midge is basically a test-vehicle to prove the airframe of the eventual Orpheus-powered Gnat which may fly next year. Engine-running trials with the Viper 101 have been very successful, and the Midge will shortly go to Boscombe Down (it may be there when these words are published) for its initial flight trials in the hands of the company's chief test pilot S/L. E. A. Tennant, D.F.C. This makes it almost certain that, if all goes well, the Midge will fly at this year's S.B.A.C. display.

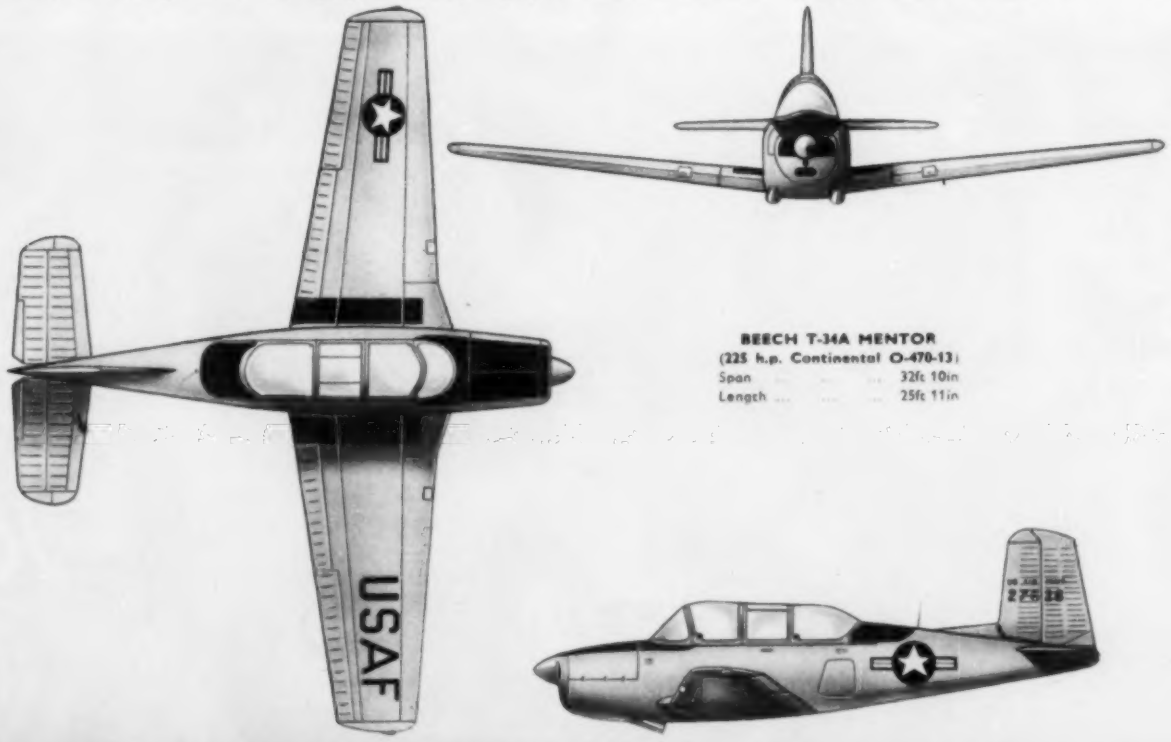
U.S.A.

Boeing 707. Contrary to what might have been expected from lectures by Boeing personnel, the new 707 transport does not employ very thick (i.e. over ½in.) wing skins, as do the Boeing B-47s. Skin gauges are reported to be comparable with those of transports now in service. Most of the structure is in high-strength aluminium alloy, although quite a lot of magnesium alloy is used in lightly-stressed portions of the airframe which must maintain a close-tolerance profile (such as the wing leading-edge) and there is some steel and titanium in the pods. All exterior riveting is flush.

Boeing B-52A. It is reported by *Aviation Week* that "defensive armament on the Boeing B-52 reverses the current trend toward larger calibres by returning to a tail turret mounting four .50-cal machine guns." This installation is a remarkable affair, mounted in the extreme tail and radar controlled, with a monitoring gunner seated at the base of the fin in a pressurized cell. The smaller B-47 has a twin-20mm turret, likewise radar-controlled but without a gunner's station; the monitoring is done from the main crew compartment.

North American F-100A. The U.S.A.F. recently displayed a model of the Super Sabre in a corridor of the Pentagon building, mounted on a stand carrying similarly scaled models of the underwing stores which the aircraft can carry. Among the 25 rockets, bombs and tanks displayed were: four extremely long, streamlined fuel tanks of about 1,100 gal total capacity; packages containing 45 Mighty Mouse folding-fin rockets (the containers being shaped rather like the sonobuoy boxes carried by Firefly 7s); a "special store" shaped like a World War 2 R.A.F. high-capacity bomb, containing an atomic tactical weapon; and selections of 750-, 1,000- and 2,000-lb bombs, and 750-lb napalm tanks.

North American TF-86. Replacing the original F-86F Sabre converted to a two-seat tandem trainer, which was lost with its pilot Joe Lynch in a take-off accident, a second two-seat Sabre has been completed, with the designation TF-86. Now about to begin flight trials, the latter aircraft will tour U.S.A.F. bases in the hands of company pilot Charles Graham.



BEECH T-34A MENTOR
(225 h.p. Continental O-470-13)

Span	32ft 10in
Length	25ft 11in

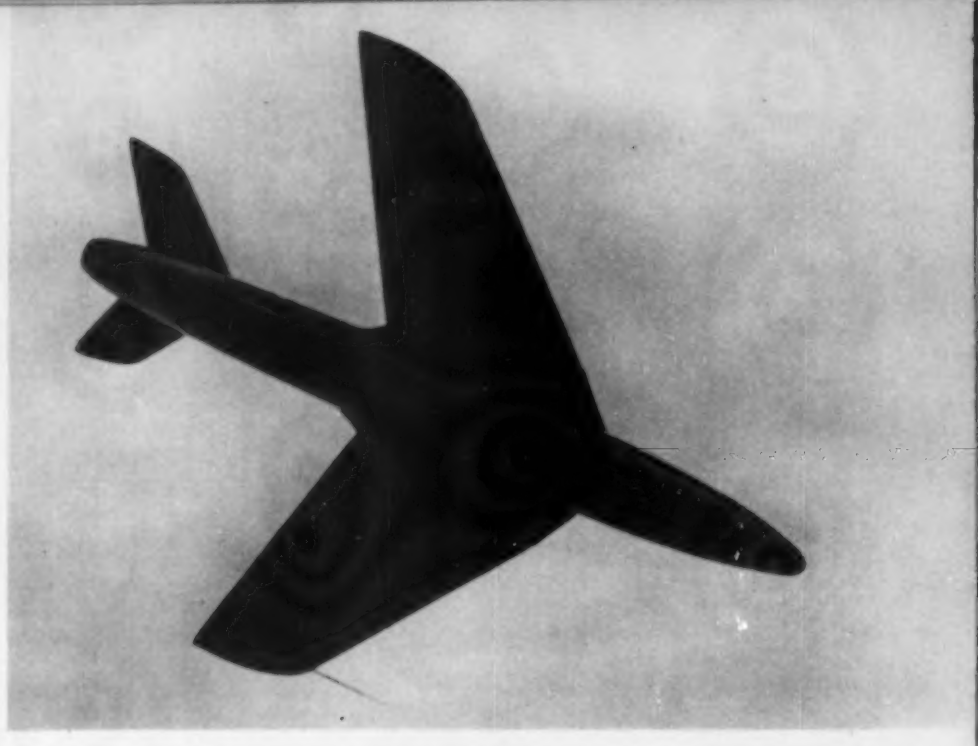
504 TO HUNTER AT C.F.S.

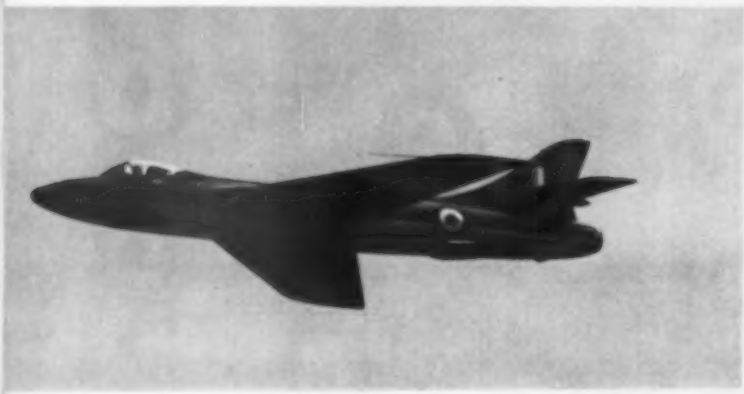
THE all-jet composite formation, depicted by the camera of Russell Adams in the two large views, is made up of aircraft of the Central Flying School Examining Wing utilized during the last six-monthly training period. The aircraft are listed in a caption on the opposite page, and their pilots (left to right, below) were: F/L. T. M. Fennell, A.F.C., F/L. M. A. McNeile, F/L. K. L. Teddutt, A.F.C., F/L. E. A. Hart, S/L. J. C. Steele, F/L. S. G. Agnew, F/L. C. S. Green, A.F.C., F/L. D. W. Plenderleith, and F/L. J. C. Owen, A.F.C. The Hunter—with production-type air brakes—was flown by F/L. C. J. G. Short (not portrayed) of the R.A.F. Handling Squadron, who is busy writing Hunter Pilot's Notes. Note, incidentally, what a large machine it is compared with the Venom and Sabre, and how great are the differences between the Meteor T.7 and N.F.14. Above and bottom right are two comparable photographs of C.F.S. "Heinz" formations by John Yoxall, the first dated 1931 and the second 1938. At Wittering in '31 and Upavon in '38, C.F.S. is now at Little Rissington.

1931 (Top, opposite page): *Gloster Gamecock I, Armstrong Whitworth Atlas (T), de Havilland Gipsy Moth, Fairey IIIF Mk IVM, Avro 504N, Armstrong Whitworth Siskin IIIA, Bristol Bulldog II.*
1938 (Below): *Avro Anson I, Airspeed Oxford I, Hawker Hart (T), Avro Tutor, Hawker Fury I.*

1954 (Above, and bottom of page opposite): *de Havilland Venom F.B.1, Canadair-built North American Sabre F.4, Hawker Hunter F.1, English Electric Canberra B.2, Gloster Meteor T.7, Armstrong Whitworth Meteor N.F.14, de Havilland Vampire T.11.*

Aspects of the HUNTER

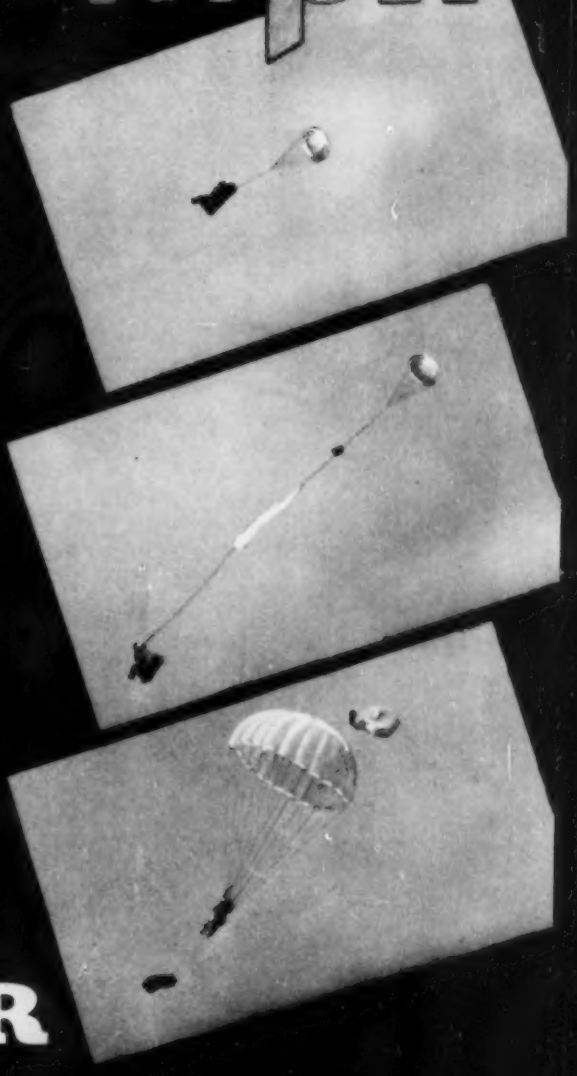




HIGHLIGHT of a quite ambitious demonstration for Home Guard and Combined Cadet Force units, described on page 204, was a performance by a production-type Hawker Hunter—WT577—flown by S/L. D. H. Seaton, D.F.C., A.F.C., of the Central Fighter Establishment. The opportunity was seized by *Flight's* photographer to get in as many "shots" as possible, and these are now presented as an aid to recognition and as an augury of the days—now near at hand—when the handsome hard-hitting Hunters will be a familiar sight in our skies. Prominent beneath the fuselage roundels are the new-type air brakes, developed, over a somewhat anxious period, to allow the Hunter to be decelerated in combat with a minimum change of trim. This, of course, is a consideration which bears strongly on the efficiency of the aircraft as a firing platform for its four 30 mm Aden guns. The ports and ejection chutes of these guns are visible under the nose, and it may be noted that no attempt has been made to fair these over, though such measures were considered worth-while in the Battle of Britain days.

at low altitudes each second is vital

150 ft. 600 mph



On the 17th March, 1954, an ejection in straight level flight was made from a Meteor 7 aircraft with the Martin-Baker Patent fully Automatic Ejection Seat.

- The speed 600 m.p.h., the height only 150 feet.
- One second after ejection, drogue developed holding seat steady and slowing it down.
- Three seconds after ejection, parachute fully developed with 80 feet in hand.

Patented in the principal countries of the world and certain patents pending.

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AUXILIARY POWER IN AIRCRAFT

Some Thoughts on Early and Modern Practice: Promise of the Small Gas Turbine

AS aircraft grow larger and more complete, and more versatile—or, in some cases, specialized—in their functions, the need for an efficient and reliable source of power for numerous ancillary services becomes increasingly apparent. In this article—which is by a well known gas-turbine engineer—the claims of the small gas turbine as an independent power-producer are put forward.

TO begin these notes with a comparison, it may be remarked that the total internal power requirements of a mercantile ship, of say, 10,000 tons—covering electrical demand, steering, winches, pumping and so on—is normally about 10-12 per cent of the installed propulsive power. A good deal of the engine installation for such power is frequently of inefficient character (e.g. non-condensing steam winch engines) because it is there only for intermittent use—a relatively few h.p. hours per voyage.

The total internal power requirement for aircraft is generally much less in proportion to propulsive power; but, again, a comparatively high fraction is only for intermittent use, and may possibly be of low efficiency.

Taking an average over four British civil transport aircraft, the maximum accessory power available is 3.7 per cent of the maximum take-off h.p.; a typical actual accessory loading during take-off is 1.33 per cent of the take-off propulsive power. The proportion of installed (i.e., available) accessory power to that actually required at one time is extremely variable, depending on the type of aircraft and its duty. It is almost unimaginable that full accessory power is ever required, though it must be there.

While no technically useful purpose is served by more closely comparing marine requirements against those of aircraft, there is one factor in common history. The marine case illustrates that auxiliary power has crept up on the main power, and continues to creep. In British aircraft, it is still the practice to depend on main-engine output to supply auxiliary power, be it electric, hydraulic or pneumatic. Practically speaking, apart from one or two isolated examples, A.P.U.s (auxiliary power units) have not "caught on" in British practice. Could it be that a prejudice was established by one unfortunate petrol fire in a stationary flying-boat several years ago?

It is worth considering some aspects of the subject as it is today. A.P.U.s were once very common, in the form of windmill-driven generators, or the even earlier windmill-driven pumps. As internal power demands went up, so were they met increasingly by power derived from main engines. Now the pendulum is swinging again.

In a modern aircraft, power is required when the craft is inoperative, for maintenance and checking purposes, for lighting and heating (or cooling) and for engine starting or inspectional "barring-over." During operation, it is required for a varying range of functions, such as lighting and heating, pressurization, operating servo-control, radio, flap, undercarriage and brake work, winches (e.g., loading-ramp winches) and pumping. It is evident that reliability in relation to some of these functions is of absolute importance, and the provision of at least two independently adequate resources is prudent. It is also evident that one (and preferably the main) power source for such functions as pressurizing, flap and undercarriage work should not be dependent on a propulsion engine, the failure of which may make urgently necessary the very service which would thereby be made available.

If it were necessary to install within an aircraft a petrol-engine A.P.U., with the attendant problems peculiar to that species, a strong adverse argument could be stated. But nowadays this is not the way to do it; either a gas turbine or a diesel is eligible on grounds of reliability and fuel-safety, and it is between these two that any sensible choice must lie, with a remotely possible steam-engine arrangement in the background.

The high-speed diesel has much to commend it. Its low fuel-consumption is some set-off against its high specific weight; and it is reliable and cheap. Against this, it is vibratory, somewhat choosy as to fuel, and in practice requires a fair amount of maintenance. It has cooling problems, its rejected heat cannot easily be used, and it is a bit awkward to pressurize (in the sense of keeping fair performance at high altitude).

Whereas conventional piston engines usually present difficulties in starting at low temperatures—and, used as A.P.U.s, need to be preheated—it has been shown in practice that a gas turbine A.P.U. is startable "on the button" down to −54 deg C. It has also been shown to require far less maintenance than a petrol engine on the same duty, and, so far, to have about twice the service life between overhauls.

The small gas turbine is light, reliable, omnivorous as to fuel, involves no cooling problem, and rejects heat in an easily usable way. It is vibrationless, relatively easy to pressurize (in the above-mentioned sense) and can, if need be, supply compressed air, at least in the low-pressure range, without extra apparatus. It can run on the same fuel as the main engines, be they petrol engines, diesel or gas turbines.

Let us consider the flight-cycle of a large transport aircraft. An hour before flight, it may be necessary to test all electrical gear, check hydraulic and pneumatic pressure lines, etc., and test all servo-gear. It may be necessary to pump fuel; in a perfect world, it is desirable to "bar-over" the main engines; the lights are on, because the cabin is being cleaned and checked; and some heating and ventilating may be required (tropically, cabin cooling is probably required). The next major operation may be to lower a ramp, winch cargo aboard, and raise the ramp. Main engines are then started, flaps operated, and undercarriage raised.

In flight, the power-demand depends so much on the particular aircraft and its job that to specify it in detail would be impossible; but some power is required all the time and, much power for some of the time. Power is a peak requirement during landing procedure. After landing, some at least of the pre-flight requirements will go on for, say, another hour.

If an A.P.U. is installed primarily for electrical generation, no great complexity is caused by providing a clutch-connected cabin blower and an entirely automatic control which would, if the cabin pressure failed, relieve the electrical load and engage the blower; the A.P.U. envisaged as continuously-running, could then either boost or wholly supply the critically necessary air.

Auxiliaries on the main engines, plus batteries, plus bottles, plus ground-carts, can look after all these requirements. If such auxiliaries are duplicated for full safety, each duplication must be adequate to cope with minimal requirements. Provision of this magnitude is very costly in weight, money and maintenance. With one fairly simple jet-propulsion engine known to the author, more failures in flight in a given lengthy period were due to auxiliaries not essential to the engine itself than to all other causes.

Several big aircraft engaged in a particular series of Service trials were each fitted with a small gas-turbine A.P.U., which ran on the same high-octane petrol as the main engines. Originally installed to save the weight of a battery specifically to operate a ramp, the A.P.U. supplied about 14 kW. It was soon found to be so convenient that it was kept running throughout flight *and*, on average, about one hour a day on the ground. Instead of operating for perhaps ten minutes per flight as originally intended, these little units were logging an hour a day more time than the main engines. Some 8,000 hours of experience have already been clocked by such units, and quite unsuspected uses found for them. The case for the A.P.U. run merely as an electrical generator appears to have been fully made.

In a full A.P.U. installation, the complete weight of which might be in the order of 400 lb, the following could be made continuously available: 50 electrical hydraulic or pneumatic h.p., plus several hundred heat h.p. at 900 deg F transmissable by heat-exchanger (not included in the weight quoted); or emergency cabin pressure air for about 40 humans at 20,000ft. The fuel consumption at full load would be about 15-20 gall/hr at ground level. Such a unit would replace equipment of which the total weight might well be about half a ton, and which would, basically, be dependent on main-engine running; so, for the same duties (including ground working), the fuel consumption would, in practice, be economically light.

The unit thus sketched in would be adequate for some transport aircraft of present-day dimensions, but quite inadequate for heavier military purposes. It is estimated that A.P.U.s of the order of 300 to 500 h.p. will shortly be needed for the bigger or heavily-armed aircraft. Whether it would be more practicable to provide several little units, or one large one, is an open question. At least one well-developed gas turbine exists today, the basic engine weight of which is 450 lb, which yields 500 shaft h.p. and which has a fuel consumption of 63 gall/hr (kerosine). The installed weight of such a unit, with reduction gearing, and all its own accessories, is well below 1,000 lb. A lightweight (400 cycle) generator to use with such an engine would weigh about 1.5-2 lb/kW.

Thus the gas turbine makes practical the "internal" powering of aircraft. There can surely be no doubt that A.P.U.s will come into aircraft, just as they came, in the adolescent phase, into power-driven ships.

The Austrian Superspatz flown by Franz Linher in the single-seater class: a "Flight" photograph on take-off.

WORLD GLIDING

Pierre a Worthy New World Champion: "Random Variations" on an All-weather Theme

By KENNETH OWEN and ALAN YATES

COINCIDING with the final stages of the World Gliding Championships came a sharp, forthright statement—as if in self-defence—from the Meteorological Office. "There is no justification," it asserted, "for regarding the weather this summer as any other than a random variation among the infinite variations of Nature." Cold and wet at Camphill, pilots and crews continued to give their own brief opinions—in over a dozen different languages—concerning Nature and her infinite variations.

What we might call the story so far, recorded in the two previous issues of *Flight*, has dealt with events up to Thursday, July 29th, when Wietüchter was leading in the single-seater class, and Rain and Komac in the two-seater class. This final report describes the concluding stages of the contests and records the final results.

Friday, July 30th.—This was an eventful day. After seven days of leaden clouds another contest day was itself a special event, but it transpired that this was also to be the first wave-flying day in the history of World Gliding Championships.

The morning was again heavily overcast but the clouds did not look to be many thousands of feet thick. Nevertheless there was no rush to accept launches by the pilots of the two-seaters, whose task had again been given as "free distance." The Italian Canguro (Mantelli and Braghini) flew alone in the strong west wind high above Bradwell Edge for nearly an hour until noon. Then a hole in the cloud layer appeared upwind over the valley from time to time, and the Canguro was seen to be flying almost at cloud base. Such holes are one of the signs that the air at cloud level is sweeping down over the valley and up again over the escarpment, reinforcing the usual hill lift, with the probability that a further series of waves will be found downwind. The Canguro rose into the cloud and, since the lift could hardly be from thermals, wave lift was confirmed.

The techniques of flying in thermals and waves differ. A thermal moves with the wind so that a glider steadily circling will remain in it and both will drift downwind. A wave is usually "anchored" to the ground and, to avoid being blown downwind, the glider must head into wind once lift is found. The Canguro apparently tried circling, lost the wave and emerged from the clouds far downwind, but managed to regain the site.

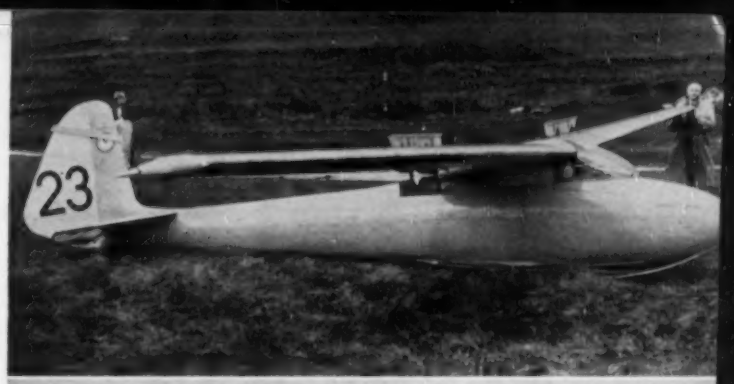
The day was not one of strong waves and, although many pilots nibbled at them, only two used them to fly away. The Jugoslav Kosava, flown by Rain and Komac, made a remarkable flight, mainly above the clouds, to reach Marham (Norfolk), 106 miles away. The Kosava left the hill-lift at Camphill in weak thermal lift during a slight break in the clouds, and reached a small sunny patch over Sheffield at about 2.30 p.m. Beyond the few weak cumulus clouds a mass of cloud could be seen to the east and two pilots were able to soar up the front of this cloud as if it were a hill in the air-stream.

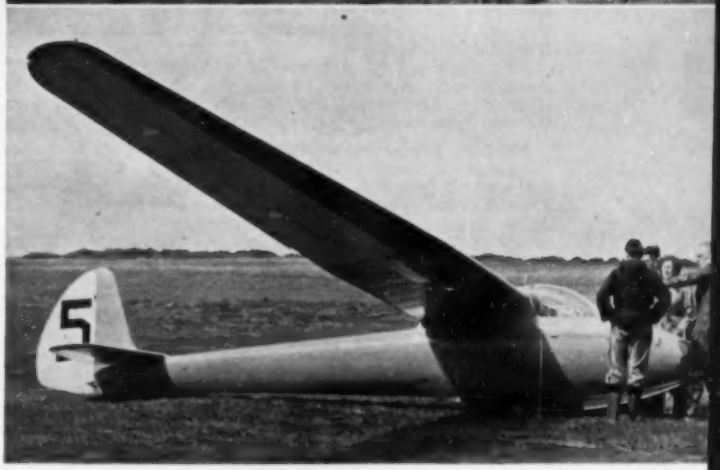
The base of the cloud layer was at 3,000ft above sea level and the Kosava was able to climb past the cloud tops at 5,000ft to reach some 8,000ft above sea level. From this position the pilot could see that the cloud cover downwind was complete but that the top surface of the cloud was corrugated in a series of great crosswind waves having a span of several miles from crest to crest. The only upper clouds were a few lenticulars which lay above the wave crests.

For two hours the Jugoslavs flew from wave to wave, climbing as they flew to and fro above the rising side of the wave, then turning downwind to the next and losing some 700ft in reaching it. Not all waves gave lift but five were used in this way before the sailplane sank into the cloud mass. When the Kosava emerged within sight of land, for the first time for two hours, it was over Cranwell. Ahead were some sunny patches and

"Flight" photograph

The new world champion, Gerard Pierre, being assisted with his parachute prior to a flight. He flew a Breguet 901.





The two British single-seaters: (upper) Elliotts' new Olympia 4, flown by Geoffrey Stephenson, (lower) the Slingsby Sky flown by Philip Wills into second place.

"Flight" photographs

cumulus clouds, and one thermal enabled the pilots to climb again from 2,700ft to 5,500ft above sea level. From this height they flew round the Wash and reached King's Lynn. Every mile counted now, but, after a series of circles in which height was neither gained nor lost, they were forced to end the flight with a straight glide to the R.A.F. airfield at Marham, where they landed at 5.20 p.m.

Philip Wills in his Sky contacted the wave rather later. He had flown in waves at Camphill three years before, but not in conditions of such heavy cloud. He emerged from the grey mass climbing only slowly and found himself in a cloud valley orientated cross-wind. The sky above was now quite clear, and the cloud layer, so close below, reflected the dazzling sunshine. Wills, ever prepared, put on dark glasses and reported by radio to his trailer crew a mile below. Having scarcely seen the sun for a week, they must have felt somewhat envious.

The wave lift was now so weak that, try as he would, Wills could not get above the crest, which was now at 5,700ft. When he had climbed to his ceiling in front of one crest he turned downwind, passed through the cloud bank and, in a minute or so, emerged into the next valley. He was able to repeat the process in nine waves and finally sank through the cloud to emerge near Newark, 40 miles from Camphill. His trailer was being driven eastwards by Mrs. Wills and the radio communication between them had been consistently strong. Both parties were gratified when Wills emerged within sight of the trailer! Like the Jugoslavs, Wills was able to prolong the flight for another 20 miles by thermal lift and landed after 62 miles to gain the full 1,000 points for the longest single-seater flight of the day.

Only these two sailplanes were able to make use of the wave lift; so many others were left soaring the limited space above Camphill that it was 5.30 p.m. before it was safe to launch the last competitor. By this time no waves were to be found. The very difficult conditions, so brilliantly used by two pilots but too difficult for most, meant that the luck of the draw was weighted against those who took off late in the day. The organizers, in devising the competition rules, had realized that this might happen, and the arrangement that each pilot need count only his four best performances was designed to eliminate this element of chance. Unfortunately the unprecedented bad weather had allowed only three days' contest flying so far, so that even poor performances might have to count in the final total. However, there were three more days in which the weather might improve.

The positions after Friday's flying were:—

Single-seaters:—

1. Wietüchter (Germany), 2,531 points.
2. Pierre (France), 2,058.
3. Wills (Great Britain), 2,037.
4. MacCready (U.S.A.), 1,664.
5. Torrell (Spain), 1,652.

Two-seaters:—

1. Rain and Komac (Jugoslavia), 1,556 points.
2. Nietlispach and Müller (Switzerland), 1,000.
3. L. and A. Welch (Great Britain), 742.
4. Smith and Kidder (U.S.A.), 667.

Saturday, July 31st.—Both classes were offered "free distance" on this day. The clouds were heavy again and thermals were expected to be weak. The two-seaters were launched first but the single-seaters followed quickly.

The thermal lift, although weak, turned out to be the best experienced during the Championship and some dozen pilots landed within sight of the sea. Those who flew east reached the Lincolnshire coast near Sutton-on-Sea, 83 miles downwind. Some, more ambitious, hoped to round the Wash and reach Norfolk. Two of the two-seaters almost succeeded in doing this: the Jugoslav Kosava (Rain and Komac) again made the longest flight of the day, reaching King's Lynn, 95 miles away; and the American Schweizer 2-25 (Smith and Kidder) reached Boston (78 miles). No other two-seater exceeded 32 miles.

Several of the single-seaters tried to make their way north of the Humber, and encountered better weather. Paul MacCready (U.S.A., Schweizer 1-23E) landed at Flamborough Head, 87 miles away, and received the day's 1,000 points in this class. Those who went straight downwind to the sea were able to cover 80-83 miles; they included Pierre (France) and Relander (Finland). Wills arrived at the sea with 4,000ft in hand, turned north and crossed the Humber. Here thermals ended and he landed near Spurn Head, 72 miles from Camphill.

After Saturday's flying the top placings were:—

Single-seaters:—

1. Pierre (France), 2,956 points.
2. Wills (Great Britain), 2,855.
3. Wietüchter (Germany), 2,817.
4. MacCready (U.S.A.), 2,664.
5. Relander (Finland), 2,254.

(Since there had now been four competition days for this class the contest was officially "Championship." If further flying days were possible, markings and positions might change if a pilot scored more points than on his least successful day. The presence of Pierre and Wills at the top (they were second and first in 1952 in Spain) after four very difficult days was noteworthy. The German and American champions were close behind.)

Two-seaters:—

1. Rain and Komac (Jugoslavia), 2,556 points.
2. Smith and Kidder (U.S.A.), 1,480.
3. Nietlispach and Müller (Switzerland), 1,292.
4. L. and A. Welch (Great Britain), 1,065.

(Another day's flying was needed to complete the minimum of four, but the Jugoslav position seemed impregnable.)

Winners in the two-seater class, Rain and Komac (Jugoslavia) receive their impressively large trophy from Mr. "Jock" Profumo.

WORLD GLIDING . . .

Sunday, August 1st.—Although rain was threatened for later in the day the forecast of reasonable thermals and a light wind encouraged the task-setters to send the two-seaters off on a race to Derby, 32 miles upwind. The wind was much stronger than forecast and the Schweizer two-seater did very well to get to within five miles of Derby. The Americans then suffered a double blow: on landing, the glider ran into a stone wall and was so damaged as to eliminate it from further contest flying. A further disappointment for its pilots was the news that only one other two-seater had exceeded the 15-mile minimum and that the day could not therefore count as a "contest day" for the Championship.

The single-seaters did not fly and the approaching front brought rain once again to Camphill in the late afternoon. Two more days to go, and one of them must permit a race for the two-seaters. . . . .

Monday, August 2nd.—Bank Holiday dawned wet and cloudy but the front passed during the morning and, for the first time for nearly a fortnight, a considerable number of sunny periods were enjoyed. The two-seaters, led today by the Slingsby T.42 *Eagle* (Lorne and Ann Welch), took the air about noon in a steady westerly wind. The task, an easier one today, was a race to Sandtoft, 40 miles downwind. The soaring conditions, however, were worse than they looked and at teatime all eight surviving two-seaters were still over Camphill.

After tea, in a desperate attempt to exceed the 15-mile minimum and score some points, most of them struggled away. Four exceeded the minimum distance, and Mantelli and Braghini in the Italian Canguro actually covered 32 miles towards the goal. Their 1,000 points worked out at one for every 50 yards and they rose from eighth position to second! Four contest days had been flown, constituting an official World Championship.

Tuesday, August 3rd.—The last possible competition day saw the passage of a warm front with attendant low cloud and drizzle. No contest flying was possible, so that the 1954 World Gliding Championships ended, after the bare minimum for each class, with the following results:—

Single-seater class (thirty-four entrants):—

World Champion: Gerard Pierre (France), Breguet 901, 2,956 points.
2. Philip Wills (Great Britain), Sky, 2,855.
3. August Wietüchter (Germany), Weihe, 2,817.
4. Paul MacCready (U.S.A.), Schweizer 1-23E, 2,664.
5. Seppo Relander (Finland), Weihe, 2,254.
6. Per Axel Persson (Sweden), Weihe, 2,118.
7. Guy Rousselet (France), Breguet 901, 1,935.
8. Miguel Ara (Spain), Sky, 1,902.
9. Franc Mordej (Jugoslavia), Orao 2c, 1,738.
10. José Ortner (Argentina), Sky, 1,666.

Geoffrey Stephenson (Great Britain, Olympia 4) was fourteenth.

Two-seater class (nine entrants):—

World Champions: Rain and Komac (Jugoslavia), Kosava, 3,056.
2. Mantelli and Braghini (Italy), Canguro, 1,558.
3. Smith and Kidder (U.S.A.), Schweizer 2-25, 1,480.
4. Nietlispach and Müller (Switzerland), Spyr 5A, 1,292.

Lorne and Ann Welch (Great Britain, T.42), were seventh.

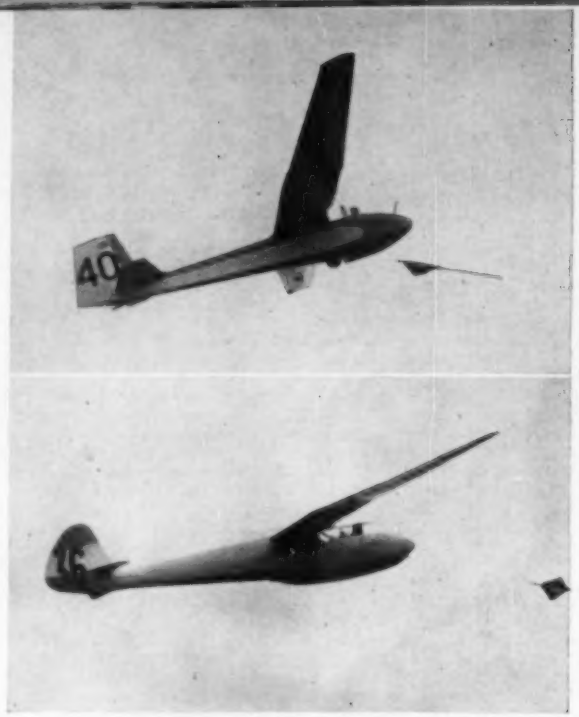
The Prize-giving

At a ceremony in Buxton on Wednesday, August 4th, the Duke of Devonshire, president of the Derby and Lancs Gliding Club, introduced Mr. J. Profumo, M.P., parliamentary secretary to the M.T.C.A., who was to present the prizes. Mr. Profumo said that he hoped that memories of the meeting would not be of rain, but of lifelong friendships, and went on to present the championship cups to Pierre and to Rain and Komac, and prizes to the runners-up. A special award of ties and scarves (B.G.A. pattern on a grey background) to the members of each ground crew was much appreciated, as was the presentation by Mrs. de Boer, Dutch team captain, of a plate of Delft china to the Derby and Lancs club on behalf of all the competitors.

Reflections on the Results

The extraordinarily bad weather might well have led to some unexpected results but an examination of the final list reveals no surprises. Pierre and Wills were second and first in the last Championships in 1952, MacCready has been in the first six since 1950 and Persson won in 1948: these four much-fancied pilots finished in the first six in the present Championships. The 101 points which separated Pierre and Wills would have been only 21 if Wills had landed when he reached the sea at 4,000ft on the last flying day, but he was forced down after returning to cross the Humber. Gerard Pierre flew consistently well and deserves to add the World title to his National title.

In the two-seater class the performance of the Jugoslav Kosava flown by Rain and Komac was brilliant. Theirs was the only sailplane to fly further than 100 miles from Camphill, and they exploited weak atmospheric waves to do it. Their lead in points was clear but there was little to choose between the other two-seaters. The last day's 1,000 points were awarded for a flight of only 32 miles by Mantelli and Braghini; the Welches could have collected 500 points more by flying an extra six miles, and would then have finished second. These freak results do not detract, however, from the well-deserved Jugoslavian win.



Two high-wing two-seaters: the Slingsby T.42 flown by Lorne and Ann Welch (No. 40), and the Argentine entry, a Condor 4.

There were four flying days for each class—only one fewer than in Spain in 1952—but the quality of the soaring conditions fell far short of that usually obtainable in this country. The wind blew from the west throughout the fortnight and allowed the hill lift to be used, but the almost complete absence of sunshine made thermal flying very difficult. It was easy to point out absurdities in the marking system, but less easy to propose an alternative which would have been fairer in the prevailing weather. The morale of the pilots and crews remained higher than many expected: gliding, at best, means hard work for each minute's flying, and the rigorous upbringing of the glider pilots had taught them patience. The living together in caravans and tents on the site led to dozens of informal parties, and international friendships prospered. If rain and cold dismayed there was always a visit to Buxton, where the OSTIV delegates were having their discussions—in a conference house with coal fires to keep the summer at bay.

Even when good flying conditions prevail, it is unwise to draw detailed comparative conclusions on the performance of the various machines over the limited period of an international contest. Still less can this be done after this year's championships. From the results, however, it is obvious that—under the bad conditions experienced—old designs such as the Weihe can still hold their own against the newer Skys, Breguets and Schweizers. Certainly, with sailplanes of this standard, it is the pilots' skill that is reflected in the results.

It is probable that the next international championships, in 1956, will be held in France. We can only hope for as friendly a meeting then as this one at Great Hucklow: thoughts on the weather are obvious—and unanimous.

R.Ae.S. SECRETARY'S TOUR

NOW on a tour of a number of the Royal Aeronautical Society's divisions in the Commonwealth is the secretary, Dr. A. M. Ballantyne. It is the purpose of his visits to assist the various divisions in the solution of their problems, and to discuss ways and means by which the Society can assist its overseas members.

Dr. Ballantyne's tour began on July 30th, when he flew from London to Johannesburg. He is now in Australia and can be contacted c/o Mr. W. Isbister, Science House, Gloucester and Essex Street, Sydney. From August 24th to September 8th he will be in New Zealand (c/o Mr. T. T. Coleridge, Shell Co. of New Zealand, P.O. Box 2091, Wellington) and on the latter date he leaves for Sydney on his way to Singapore, where is is due on the 10th (c/o Mr. A. M. Lovatt, Shell House, Collyer Quay, Singapore). Leaving Singapore on September 16th, he should arrive at London Airport on September 17th.

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BRITANNIA BULLETIN

A Progress Report on Bristol's Turboprop Airliner

AS shown by the photograph below, six production Britannias are on the stocks in the centre bay of the Bristol Aeroplane Company's vast assembly hall at Filton. But this impressive scene is only part of the production picture; a visitor to Filton would also see, in an adjoining bay, the first prototype Britannia, G-ALBO, the first production Mk 100 and the first Mk 300. Here, then, is a background for a survey of Britannia progress since the maiden flight of G-ALBO just on two years ago.

Britannia flying time has now reached a total of 309 hr 50 min. Of this 258 hr 40 min have been logged in G-ALBO and the remainder in G-ALRX, the ill-fated second prototype which was dismantled after the forced-landing last February. Flight development was restricted by the less serious mishap and subsequent investigations which has kept the first prototype on the ground until last week. Both G-ALBO and G-ANBA, the first production aircraft, are about to resume an intensive programme of flight testing directed mainly towards qualifying the Britannia for a Certificate of Airworthiness.

The first fifteen of B.O.A.C.'s Britannia fleet will be Mk 100s with fuselage 10ft 3in shorter than those of the 250 and 300. The Corporation has also ordered eighteen Mk 300s and has an option on two more. The Mk 250 is basically similar to the 300 but has provision for a large freight compartment occupying the forward part of the main cabin, together with a 73in × 93in cargo loading door; Bristol hold a letter of intent from Qantas for six of these aircraft. Both the 250 and the 300 can be supplied in the newly developed L.R. (long-range) version; this will have additional outer wing tanks and two extra cells in the centre-section which will transfer a total of 1,500 gallons more to the main fuel system. At least eight of B.O.A.C.'s 300s will have the extra tanks, and it may be assumed that Qantas, as long-range operators, will choose the L.R. version of the 250.

Bristol's present assembly line at Filton is building up to a rate of output of about two aircraft monthly. The pace of production is therefore seen to be well matched to the total of 41 aircraft firmly or tentatively ordered. Arrangements have been made to set up a second production line, licensed construction of Britannias in the Belfast works of Short Bros. and Harland, Ltd., (in which the Bristol Aeroplane Co., incidentally, recently acquired a 15¼ per cent investment). The approximate annual output of Britannias from the two lines could then reach a peak of 50 aircraft.

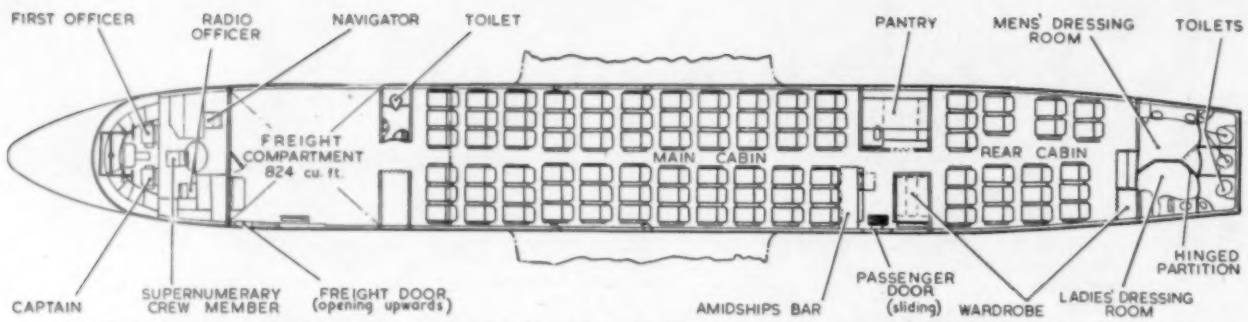
The Britannia's success in the export market depends almost entirely on its performance in scheduled service with B.O.A.C., as indicated by the magnificent outcome of the Viscount's first operational year with B.E.A. The importance of the pioneering work performed by an airline operator with a brand-new commercial aircraft cannot be under-estimated—either from the technical or the commercial viewpoints. Several major European airline and not a few American operators have sent their representatives to Filton to investigate and report on the Britannia. Bristol's believe uncompromisingly that the turboprop will answer most of the medium- and long-range operators' problems for many years to come, and it is probably true to say that an increasing number of airline executives are prepared to support this view.

Paper studies performed by airline planning staffs usually show that the Britannia offers a really big increase in productive capacity, compared with the output of latest American long-range types. If the manufacturers could give a money-back guarantee that the Britannia will live up to its brochure figures and perform with 100 per cent reliability over a full operating life of around 30,000 hr, it is probable that the total number on order would increase by 100 practically overnight. Naturally, no such guarantee will ever be given for any new aircraft, and no sizeable queue for the Britannia is likely to be seen until the type has proved itself in service.

The capabilities of the Britannia can now be assessed with the aid of recently compiled performance data. Although performance measurements will not be completed for many months, the designers' estimates have now been strongly reinforced by the results of flight trials completed to date.

The advanced method of construction adopted for the aircraft provides complete freedom from obstructions throughout the length of the main cabin, and the width of the fuselage permits installation of four, five or six seats abreast. The cabin floor has

Britannias in production for B.O.A.C. at Filton. The floor-plan will shortly be revised, permitting assembly of eight airframes instead of six, as shown here, in this centre bay of the famous Brabazon hangar.



The capacity of the Britannia fuselage is indicated by this plan of a Mk 250 passenger/freighter, accommodating 87 people and 8 tons of freight.

BRITANNIA BULLETIN . . .

eight longitudinal rails with seat-attachment holes at one-inch intervals, facilitating an extremely wide range of seating layouts; rearward-facing seats, incidentally, can be fitted without weight penalty. The proposed basic arrangement for the Mk 300 (tourist version) will accommodate 99-101 passengers—the majority in six-abreast seats—in three separate cabins. Space remains for ample toilet, wardrobe and galley compartments, and beneath the floor are two freight compartments with a total capacity of 829 cu ft. The forward compartment of the Mk 250 provides a further 824 cu ft of cargo space, and this model has sufficient cabin space remaining for 87 passengers, galley and toilets.

Maximum payloads for the Mk 300 and the Mk 250 are, respectively, 30,000 lb and 36,800 lb. Assuming that a standard passenger plus baggage weighs 220 lb, a 100-seat Britannia with every seat filled and three tons of mail and cargo below decks would still be carrying less than its theoretical maximum payload. It will be seen, therefore, that in practice Britannias will be capable of carrying a heavy passenger complement well beyond the point at which the payload-range curve begins its descent.

With 15,000 lb of payload, for example, the Mk 300 L.R. is credited with a still air range of 5,350 n.m. The actual stage length which it could fly with such a load (which is equivalent to upwards of 70 passengers and baggage) would depend upon the amount of reserve fuel specified, which in turn varies greatly according to individual operators' policies and route conditions.

On the basis of these figures, however, it seems likely that the Britannia will be the first transport capable of covering the 3,000 n.m. between London and New York against the prevailing winds with year-round regularity and carrying a really worthwhile payload. The standard and L.R. Britannia 300s are expected to carry their full payloads of 30,000 lb for still-air distances of, respectively 3,350 and 3,880 n.m. Multiplying these distances by 0·7 might provide a rule-of-thumb indication of the practical stage-lengths which the Britannia will handle when carrying this enormous payload.

These distances are based on the optimum range procedure and of maintaining a true air-speed of 300 kt (345 m.p.h.). Where extreme range is not required, the Britannia should be able to cruise at speeds unsurpassed by any rival other than the pure jet airliner. Cruising technique for all but the longest distances will be to maintain a constant true air-speed of around 355 kt (385 m.p.h.). The Britannia's ability to cruise enconomically through the upper band of heights at varying speeds is thought to make it one of the most flexible long-range aircraft ever produced. Except for extreme ranges, ton-mile costs vary only slightly in relation to the varying heights and speeds which can be used. Operators should thus be able to take wind conditions, icing and turbulence fully into account when preparing a flight plan without serious loss of payload or range.

First large turboprop to approach certification for civil use, the Bristol Proteus is in two senses the key to the success of the Britannia. While this engine undoubtedly confers an extremely promising performance it also introduces an unknown quantity—so far as airline operators, ever mindful of the disastrous effects of unreliability in service, are concerned. To date, about 60 Proteus of various marks have been built and test-bed engines have logged a total of 23,000 hr. Proteus flying time amounts to 3,300 hr—a total which includes over 100 engine hours flown in the prototype Ambassador G-AKRD, now fitted with two Proteus 705, as well as the time logged by the Princess and a Lincoln test-bed fitted with two earlier units. Obviously more flying experience with the Proteus will be required before the Britannia enters service, but this is automatically assured by the pre-service test programme to be flown by the prototype and production Britannias during the coming months. Mk 100s for B.O.A.C. will be fitted with the Proteus 705 of 3,780 e.h.p., but all subsequent aircraft will have the improved Proteus 755 of 4,150 e.h.p. The time taken to change a Proteus 755 power plant, incidentally, is quoted as four man-hours.

Bristol's engineers are confident that the Proteus can attain an overhaul time of 2,000 hr within two years, and that in every other respect it will prove a worthy companion to the magnificent Britannia airframe.

BRITANNIA 250 AND 300

Four Bristol Proteus 755, each of 4,150 e.h.p.

Dimensions:—	
Span	142ft 3½in
Wing area (gross)	2,075 sq ft
Length	124ft 3in
Height	36ft 8in
Fuselage diameter (max.)	12ft
Weights and fuel capacity:—	
Gross weight (standard)	155,000 lb
Gross weight (long range)	165,000 lb
Basic operational weight (typical)	81,000 lb
Fuel capacity (standard)	6,800 Imp gal
Fuel capacity (long-range)	8,300 Imp gal

HARWELL'S "DIMPLE"

THE United Kingdom Atomic Energy Authority announced last week that Britain's first heavy-water reactor which has been built at Harwell is now in operation. It is known as "Dimple," from the initial letters of the description "deuterium moderated pile, low-energy."

Dimple, explains the A.E.A., is a low-powered thermal neutron research reactor or atomic pile. The heavy-water moderator (material which slows down atomic particles to make the reaction more efficient) is contained in a tank which is surrounded by a graphite neutron reflector, and outside this is a concrete radiation shield. The reactor fuel is submerged in the heavy water. Both the type of fuel and its arrangement in the tank can be changed quickly so that what is, in effect, a different design of reactor can be built up in a matter of a few days. The reactor will be operated only at very low power so that its structure does not become sufficiently radioactive to prevent the necessary handling.

The versatility of Dimple will make it an extremely valuable tool in the design of future power producing reactors and for measuring essential constants in reactor physics.

One of the first functions of the new equipment will be to carry out experimental work for E.443, the new and more powerful heavy-water reactor which is now being built at Harwell to provide the high neutron-flux essential for some research.

On August 1st, incidentally, the United Kingdom Atomic Energy Authority, established under an Act passed earlier this year, took over responsibility for atomic-energy research and development from the Department of Atomic Energy. The new organization has Sir Edwin Plowden, K.C.B., K.B.E., as chairman of its board.

The principal establishments which will be taken over by the Authority are: the Atomic Energy Research Establishment at Harwell, with its dependency the Radiochemical Centre at Amersham; Atomic Weapons Research Establishment, Aldermaston, near Reading; the Industrial Group Headquarters at Risley, for planning and administration; the Uranium-Ore Processing Plant at Springfields, near Preston, Lancs; the Plutonium Factory at Sellafield, Cumberland; and the Gaseous Diffusion Plant at Capenhurst (for separation of Uranium 235 from 238). In addition to these there is a power station being built at Calder Hall, Cumberland, and another is projected at Dounreay, in the north of Scotland.

CORRESPONDENCE

The Editor of "Flight" does not hold himself responsible for the views expressed by correspondents in these columns; the names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

Preserving a True Spitfire

I AM happy to be able to assure Mr. Jenkins, who wrote in your issue of July 9th, that we are now the proud owners of the Spitfire to which he refers in his letter.

We started negotiations for the purchase of this aircraft some time ago, and it will shortlly be in our hangar at Chilbolton. Although this machine actually has a civil registration we intend to keep it as a "true veteran" in its correct Service markings and with its original serial number. A. Cdre. Wheeler has done a great service in preserving this aeroplane, for specimens of such an early mark of Spitfire are now virtually impossible to obtain.

We hope to give Mr. Jenkins the pleasure of seeing this machine again on future occasions and I, incidentally, look forward to the pleasure of flying it.

Hursley Park, Hants. JEFFREY QUILL.
Vickers-Armstrongs, Ltd., Supermarine Works.

Aircraft Exhaust Silencing

I HAVE read with much interest the discussions in Parliament on the above subject and the many letters of protest which have appeared in the daily Press. Every scientific advance generally seems to cause much destructive criticism, helpful suggestions usually being absent. I remember well that, when M. Blériot flew the Channel in 1909, a quite well-informed lady said to me that it was a wonderful achievement, but she was quite certain that if God had meant us to fly He would have given us wings; and therefore it was quite wrong to fly and must never be done again.

May I remind your readers that I was responsible for a highly successful demonstration at Hanworth Aerodrome, Middlesex, in September 1934, when, in front of all the appropriate authorities, a number of well-known single- and twin-engined aircraft were flown at varying heights. The engines were fitted with exhaust silencers, designed and made by my private company, C. G. Vokes and Co., Ltd. At 2,000ft, generally speaking, the machines were inaudible from the ground and, to quote a contemporary report: "With the silencer there was very little noise indeed, and when the machine was flying at 500ft anyone on the ground might quite well have been pardoned for thinking that it was only a motor car passing along a nearby road. The reduction of noise in the cabin was equally outstanding, and conversation was easily carried on."

The weight of the exhaust silencer was very low. In one case it was only 16 lb, and the reduction in r.p.m., due to increased back pressure in the engine, was about 50. Further, a noise reduction of 30 decibels had been obtained with many different engines.

It is also interesting to note that approval for the fitment of silencers was given by the Air Ministry at that time for a number of machines. With a success of this nature 20 years ago, and the intervening years of research and development, I do not think there can be any insurmountable technical problems to obtain either equally good, or probably better, results.

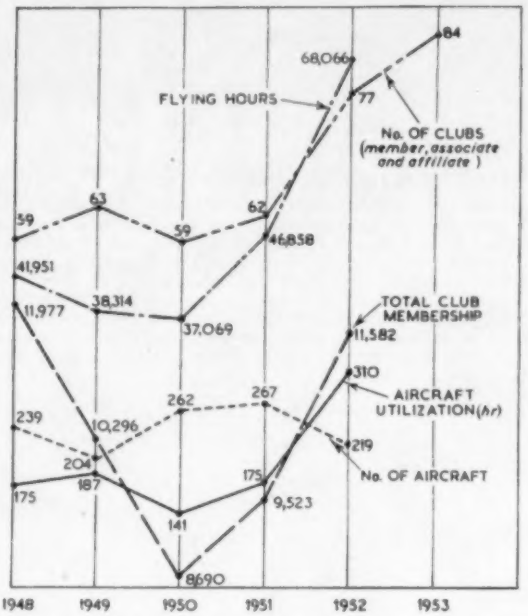
I understand there are a number of municipally owned aerodromes which have not been able to progress or expand because of the noise problem, and I sincerely hope this letter will give them the necessary incentive to tackle this problem.

Holybourne, Hants. C. G. VOKES.

Support for the Clubs

THE attention of my Council has been drawn to your issue of April 2nd, 1954, in which, under the heading "Royal Aero Club A.G.M.," you report it as having been stated in connection with the Kemsley Flying Trust that "While interest in the light aeroplane clubs remains at a low level, the trustees are not able to do as much as they would like to help towards an extension of the flying club movement. On the other hand, the growing interest in gliding has called for a great deal of assistance from the fund, which has been readily afforded and produced most excellent and encouraging results . . ."

The attention of my Council has also been called to the statement in the official programme of the National Air Races held at Coventry on June 19th, 1954, in which it is stated that the Kemsley Flying Trust was endowed with a fund of £100,000 " . . . dedicated to the cause of private flying through the medium of the flying clubs. Many clubs have benefited from the trust, which has helped them to acquire aircraft and equipment on a long-term loan basis."



These A.B.A.C. figures show the progress of the flying-club movement.

The statements quoted above would seem to be somewhat contradictory, and furthermore my Council are aware of only one case during the last eighteen months in which clubs have benefited from the Trust in the manner indicated, and can call to mind only five instances of our member-clubs having been so assisted since the Trust was formed in 1947.

The level of interest in the flying-club movement is illustrated by the graph [reproduced above—Ed]. The figures for the year 1953 cannot be completed until statistics have been received from all our member-clubs, but the present number of member-clubs of all grades is 91. It would be interesting if comparable figures were published by the British Gliding Association, whose work my Council holds in high regard, and towards whom we have the greatest goodwill. E. SOUTHERN,

London, S.W.1. Secretary,
Association of British Aero Clubs and Centres, Ltd.

[The statement referred to by Mr. Southern was contained in a direct report of the chairman's speech at the R.Ae.C. annual general meeting—Ed.]

Airliners in Warpaint

HAVING read Mr. Hill-Reid's letter in your issue of July 23rd, and those of previous correspondents, I think I can give a little more information about *Golden Fleece*.

In the summer of 1941, about July, I was attached to R.A.F. Station, Calshot, for 14 days to act as locum whilst the station equipment officer was on leave. One of the jobs I did during my stay there was to "write-off" *Golden Fleece*; so this aircraft, at least, must have been taken over by the Air Ministry. Unfortunately, memory grows dim after so many years have passed and I am unable to recall the circumstances which brought about the loss of this aircraft, though I have a hazy idea she was wrecked at Lisbon, as suggested by Mr. Hill-Reid.

Maidstone, Kent. NIAL C. PALMAR.

PERHAPS the following information will be of interest to Mr. Alan Hill-Reid of Singapore (Correspondence, July 23rd, 1954).

In 1940 the three Imperial Airways "Grenadier" Class Short S26/M flying-boats were taken over by the Air Ministry and were known as "G" Flight, consisting of *Golden Fleece* (X8274), *Golden Hind* (X8275), and *Golden Horn* (X8273). Each was fitted with three four-gun Boulton Paul turrets, and eight bomb racks under the wings.

In March 1941, the unit became No. 119 Squadron, R.A.F., but was disbanded during December 1941, reforming in April 1942, with Catalinas. Re-equipment took place in September 1942 with Sunderlands and the squadron disbanded once again on April 17th, 1943.

The unit reformed in July 1944, with Albacores from No. 415 Squadron, R.C.A.F., and operated on anti-submarine patrols off the Belgian coast, using, from January 1945, Swordfish aircraft in addition to the Albacores.

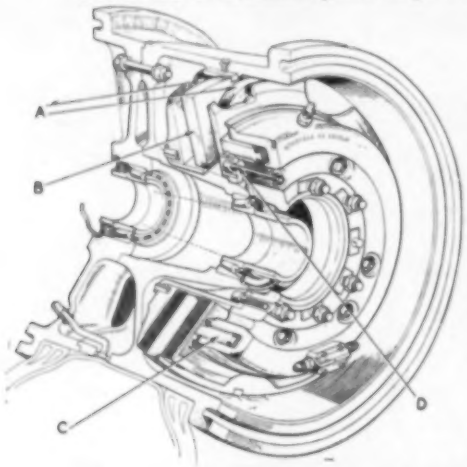
London, N.10. P. M. H. LEWIS.

THE INDUSTRY

Annular-piston Disc Brakes

A NEW type of Goodyear aircraft brake—in production at the new aviation products factory of the Goodyear Tyre and Rubber Co., at Wallasey—is now going into service on the fleet of six Vickers-Armstrongs Viscounts for Trans-Australia Airlines, the first of which was recently completed.

Though of single-disc construction, the new brake differs from the orthodox type in that the usual group of individual operating pistons is replaced by a single annular piston. This is the first introduction of the annular-piston design to aircraft braking. Contained entirely within the wheel, the new brake is claimed to effect a weight saving and to give ease of maintenance and enhanced reliability by reason of its constructional simplicity.



Part-sectioned view of the new Goodyear single-disc brake, showing constructional details.

A—Linings.
B—Single disc.
C—Annular piston.
D—Automatic adjustment.

T.A.A. already have considerable operating experience with other types of Goodyear single-disc brake. Other equipment by the same makers on the new Viscounts consists of the wheels and tyres, and the master cylinder and relay valves for the braking system.

Precision Revolution Counter

A NEW precision revolution counter—and one which should be of considerable interest to gas-turbine engineers—is announced by the Plessey Co., Ltd., Ilford, Essex. It is, in essence, a precision tachometer which counts the number of electrical pulses generated in a period of one second and, utilizing a frequency-multiplier unit, gives a visual reading in r.p.m.

Normally the pulses are counted for one second, the answer is displayed for 0.8 sec, and the apparatus is then returned to zero for the cycle to be repeated. Alternatively, the instrument may be operated manually by means of a push-button; when this is pressed, the previous count is cleared to zero, then the incoming pulses are counted for one second. This count is then displayed until the button is again operated, whereupon the sequence is repeated.

Accuracy is stated to be 0.1 per cent, rising to 0.03 per cent for high rates of counting, e.g., at 3,000 pulses/sec. Longer counting periods of 2 sec or 4 sec can also be selected, providing an accuracy better than 0.01 per cent.

Preventing Cockpit Condensation

CONDENSATION on the interior walls of aircraft flight-decks has long been a problem, of greater or less severity in relation to operating conditions (outside air temperature, rate of let-down, etc.) and the relative efficiency of different cabin air conditioning installations. In some circumstances the phenomenon is particularly marked, e.g., when condensed moisture, frozen at operating altitude, melts quickly as the aircraft descends into warmer layers.

It is seldom practicable to apply the remedies established in other fields—for example, the familiar rough-surfaced finish used on ships' deck-heads—even assuming their efficiency to be such as to meet the very severe conditions obtaining in aircraft.

A new finish prepared for domestic and industrial use, and found equally efficacious in aircraft, is Seculate anti-condesation compound, a product of British Lead Mills, Ltd., Byron House, St. James's Street, London, S.W.1. Smooth-surfaced, it is not an absorbent material; instead, it depends for its effectiveness on establishing a thermal-insulation coating on the surface to which it is applied. Its properties are not exhausted by prolonged exposure to moisture-laden atmospheres.

British Lead Mills state that Seculate has been ordered by an operator of Stratocruisers on transatlantic services, and that it is also being employed on production aircraft by the makers of a well known fighter.

Pilots' reports during a series of tests of the finish have spoken of a complete lack of condensation in a pressurized civil aircraft flying for an extended period in an outside air temperature above −15 deg C and "very slight" condensation in temperatures down to −24 deg C. Untreated areas in the same aircraft produced a steady dripping. Another of the reports mentioned that at 25,000ft, with an O.A.T. of −34 deg C, "no water fell from above the pilots' heads . . . it is considered that the treatment gives a great improvement."

For aviation purposes, Seculate is applied over a metal primer to a thickness which varies, according to likely operational requirements, between $\frac{1}{32}$in and $\frac{1}{16}$in. Weight of a $\frac{1}{16}$in film is about 2 oz/sq ft. The compound is applied by brushing on two or three liberal coats. It is off-white in colour, but a top coat of Seculate decorative finish, available in 16 pastel shades, can be applied. A black finish is available for use in night fighters. The surface is easily washable, and is not harmed by detergents.

Seculate is stated to be quick-drying, to be fire-retardent in accordance with B.S.S. 476-1932 and to have exceptionally high resistance to vibration; extended vibration tests of the compound were carried out on an aero-engine test-bed.

IN BRIEF

Mr. Ray Langmead, until recently senior liaison representative of the de Havilland Enterprise in France, has been appointed technical services manager to Smiths Aircraft Instruments, Ltd., and their aviation associates.

* * *

A number of sailplanes in the International Gliding Championships—including the Jugoslav Kosava placed first in the two-seater class—used Venner lightweight silver-zinc batteries for such purposes as gyro-instrument drives. These batteries were of the 12-volt 25 a.h. type, weighing 7 lb.

MR. W. S. HAGGETT, who, as executive assistant to the president, will be in charge of the Winnipeg plant of MacDonald Brothers Aircraft, Ltd. The new president is Mr. R. J. Reynolds, executive vice-president of the Bristol Aeroplane Co., Ltd., in Montreal. As we reported last week, the MacDonald business has been acquired by the parent Bristol company. Mr. Haggett became sales manager of the Canadian Bristol company in 1951.

APPOINTED EXECUTIVE DIRECTORS of the Plessey Co., Ltd., are Mr. John Hilton, O.B.E., M.I.Mech.E., and (right) Mr. C. D. H. Webb, A.I.E.E., A.I.Mech.E. Mr. Hilton was appointed general manager of Plessey's aircraft mechanical division in 1951 and Mr. Webb similarly promoted in the electrical division in 1947.

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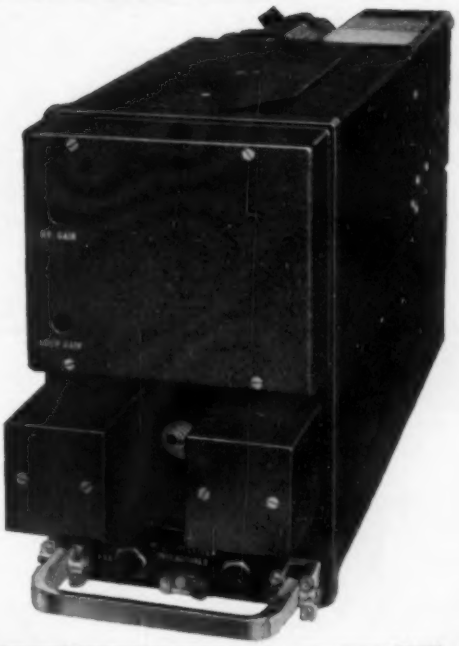

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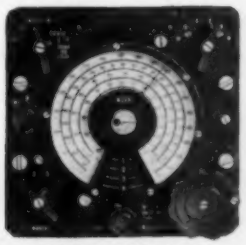
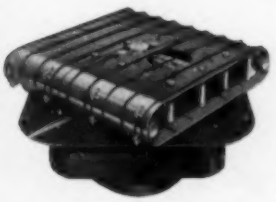


RECEIVER CONTROLLER



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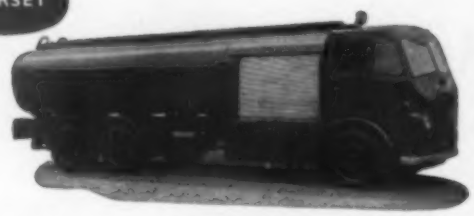

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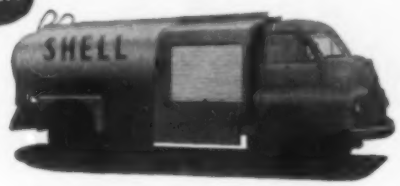

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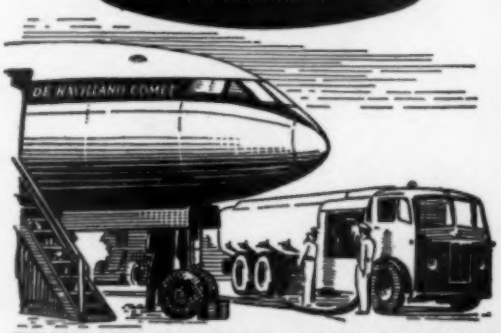

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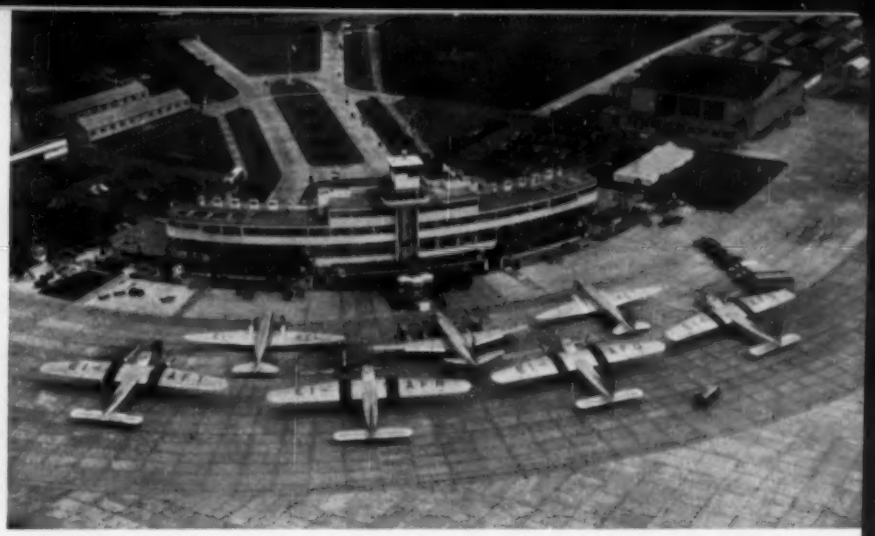

AIRPORT SERVICE: Dublin Airport's fine terminal building makes an unusual setting for a religious ceremony—the recent blessing of the Aer Lingus fleet. Paraded on the apron are four Bristol 170s, two Dakotas and a Viscount. "Aerophotos," Dublin

RENFREW: A B.E.A. STATEMENT

CONTROVERSY over the future of B.E.A.'s maintenance base at Renfrew, Glasgow, has been brought to a head by the news that all Vikings will be withdrawn from B.E.A. service in October. During the course of the next few years the Corporation's Pionair DC-3s are also due to pass out of service as their work is taken over by Elizabethans and Viscounts. In a statement issued on August 5th, B.E.A. said that in these circumstances, "a substantial financial economy would result from the transfer of the remaining Pionair work from Renfrew to London Airport, together with a proportion of those of the skilled Scottish engineering staff who are willing and able to move with them to London."

While convinced that on commercial and economic grounds the transfer should take place, and that a public court of inquiry would be inappropriate to the situation, the Corporation states that it has sought the opinion of the Minister of Transport and Civil Aviation on whether wider national issues—including that of light industry in Scotland—should prevail over what would otherwise be a normal commercial decision. To counteract trade union allegations that B.E.A. are exaggerating the economic effects of centralizing their maintenance work, the Corporation will submit its figures to an independent assessor for scrutiny.

THE AMERICAN AIRLINES STRIKE

MORE than 170 aircraft have been grounded and flights have been cancelled at the rate of nearly 400 daily by the strike of American Airlines pilots which began at midnight on July 30th. At the time of going to press there was no news of a settlement between the company and its pilots, numbering 1,243.

The dispute centres on the non-stop service from New York to Los Angeles introduced with Douglas DC-7 aircraft in November last year. Section 40.320 (B) of the Civil Air Regulations stipulates that the duration of American domestic air services must be limited to eight hours; the New York-Los Angeles flight was originally scheduled to take 7 hr 55 min. Experience soon showed, however, that this schedule was unrealistic: with the prevailing head winds, the average block time for the westbound non-stop crossing proved to be about 8 hr 40 min.

American Airlines accordingly petitioned the Civil Aeronautics Board for a waiving of the "eight hour rule" and similar petitions were filed by United Air Lines and T.W.A., who were also contemplating non-stop trans-continental services. This petition was granted by the adoption of an *ad hoc* regulation which, in effect, permitted non-stop flights of up to 10 hr only by DC-7s or Super Constellations operating coast-to-coast services and manned by a crew of at least two pilots and a flight engineer. The waiver was opposed by two of the five members of the C.A.B. and by the Air Line Pilots Association.

On August 5th, letters were sent to all the striking pilots advising them that they had been suspended from duty and that they would receive no pay during the period of suspension. Pilots were warned that if the strike continued the company reserved the right of stopping the accrual of seniority and of terminating their employment. All American Airlines sales offices were kept open and it is reported that other companies received about 70 per cent of the traffic which normally would have been carried by A.A. Many of American Airlines' employees responded immediately to the company's proposal that they should take a week or more of their annual holiday during the period of the strike. Subject to the availability of seats, the airline personnel and their families are normally allowed unlimited free air travel to and from their holidays; those on vacation during the strike will be credited with a backlog of free travel.

On August 3rd American Airlines filed a suit against three members of the A.L.P.A. claiming $1m damages as the result of the strike, plus further damages to cover losses subsequent to that date. The suit also asks for $250,000 damages for "illegal activities on the part of the union and its leaders to induce the individual pilots of the company not to fulfil their obligations under contract."

An A.L.P.A. spokesman stated that the dispute could be settled quickly if the company would schedule a 20-minute stop on the westbound service to permit crews to be slipped. The company replied that such a stop would add at least 40 minutes to the schedule and would also take away the pilot's ability to pick the most advantageous route for each day's particular wind and weather conditions.

For long-haul international services by U.S. airlines, the C.A.B. stipulates a 12 hr limitation on the duration of flights by crews consisting of two pilots and a third member. The eight-hour rule for domestic services, although originally adopted in 1931, has been retained despite improved cockpit conditions for pilots from the aspects of comfort, noise level, instrumentation and flight aids. The Board believes, however, that in general, the retention of the rule is justified in view of the congested condition of U.S. domestic airports and the lower reaches of the airways, which "undoubtedly produce a tension on the flight crew on each landing and take-off." In the case of the trans-continental services by high-altitude pressurized aircraft, however, it is claimed that cockpit conditions are comparable with those on overseas routes where the 12 hr rule applies.

Some pilots are reported to favour the non-stop schedule, since it allows them to fulfil their monthly flying commitment within ten days. Nevertheless, there appears to be solid professional backing for the A.L.P.A. view that normal safety regulations have been relaxed in the interests of commercial expediency.

A.T.A.C. APPOINTMENTS

THE Lord Chancellor has re-appointed Lord Terrington as chairman of the Air Transport Advisory Council for a further two years. Mr. Gerard d'Erlanger, Sir John Ure Primrose and Mr. J. J. Taylor have also been re-appointed for a further two years by the Minister of Transport and Civil Aviation.

Mr. d'Erlanger has been appointed deputy chairman in succession to Lord Runciman, whose other commitments do not enable him to continue as a full member of the Council. On his appointment as deputy chairman, Mr. d'Erlanger is relinquishing his directorship of the British Maritime Trust. The Council have appointed Lord Runciman as an assessor.

I.A.T.A. IN PARIS

PARIS will be the scene of the tenth Annual General Meeting of the International Air Transport Association. The timing of the meeting—sessions begin on September 13th and end on September 17th—will undoubtedly provide senior executives of the 70 member airlines with an additional incentive to attend the S.B.A.C. flying display and exhibition, to be held at Farnborough during the preceding week. On the opening day of the meeting M. Max Hymans, president of Air France, will take over from Mr. Gordon McGregor, his Trans-Canada Airlines counterpart, as the first French president of I.A.T.A. The scheduled airlines of France will act as hosts to the delegates.

AVIANCA CONSTELLATION LOST

ALL 30 occupants were killed when an Avianca Constellation 749A struck high ground and caught fire soon after take-off from Lagens, Azores, in the early hours of August 9th. Santa Maria Airport is the normal stopping point in the Azores for Avianca's weekly flight from Hamburg to Bogota, but on this occasion fog caused a diversion to the military base at Lagens. The Constellation was one of two operated by the Colombian airline, which is the oldest in the Western Hemisphere; three Super Constellations are on order.

STRIKE-BOUND, some of the 177 aircraft of American Airlines are seen lying idle at La Guardia Airport, New York. On August 3rd, four days after the company's pilots came out, American Airlines filed suit against the Air Line Pilots' Association for $1m compensating damages. The strike is in protest against the 8hr 35min non-stop DC-7 flight from New York to Los Angeles.

CIVIL AVIATION . . .

SUPER CONNIE FROM SYDNEY

THE first Qantas Super Constellation to visit the United Kingdom was VH-EAH *Southern Sky*, which arrived at London Airport on August 5th, inaugurating a new weekly service on the Kangaroo route. The return flight to Sydney began the following day.

With the introduction of the new aircraft on the 12,000-mile London - Sydney route, Qantas schedules have been revised. The Super Connie service departs from Sydney each Monday and from London each Friday, calling *en route* at Darwin, Djakarta, Singapore, Bangkok, Calcutta, Karachi, Beirut, Rome and Frankfurt. In addition, there is a weekly tourist service routed *via* Colombo and Bombay, operated with Constellation 749s and leaving London each Sunday. The remaining weekly first-class service, also operated by 749 Constellations, through Bangkok, Calcutta and Cairo, leaves London on Thursdays. As employed on the London - Sydney route, the Super Connie has 35 tourist seats, 20 first-class seats and seven de luxe reclining seats.

CENTRAL AFRICAN VISCOUNTS

THE number of Vickers-Armstrongs Viscounts firmly ordered was increased to 106 on August 4th when the chairman of Central African Airways, Colonel Ellis Robins, signed a contract in Salisbury, Southern Rhodesia, for five Viscount 700Ds. As reported on an earlier page, the total soared to 143 a few days later when Capital Airlines took up their option for 37.

The value of the C.A.A. order is quoted as £1½m, including initial provision for spares. The designation 700D, which has not previously been published, has been applied to an improved Viscount with the same basic fuselage and capacity as existing models, but with improved performance throughout the range-scale. Some of the improvements are to be incorporated in the Viscount 720s ordered by Trans-Australia Airlines.

Central African Airways, national operator for the Federation of Rhodesia and Nyasaland, have a network covering more than 8,000 unduplicated miles of routes within Central Africa, in addition to the Colonial Coach "Zambezi" service to London. The airline is now carrying passengers at the rate of 126,000 a year, the bulk of whom travel in C.A.A.'s fleet of nine Vikings. Federal Government authority to replace Vikings with Viscounts was officially granted last May, and it is hoped that the new aircraft will be in service by the beginning of 1956.

The outstanding feature of the 700D will be the installation of Rolls-Royce Dart RDa.6 (Mk 510) turboprops developing 1,550 s.h.p. for take-off—an increase of 150 s.h.p. Various advantages accrue from the increase in take-off and cruising power. Maximum take-off weight is increased from 57,000 to 60,000 lb and maximum landing weight from 50,000 to 54,000 lb. Fuel capacity is raised from 1,720 gallons to 1,950 gallons in the 700D, which will be equipped to carry external slipper tanks carrying a further 290 gallons. These tanks, to be situated outboard of the engines on the wing leading edge, will be easily removed though not jettisonable. Three other new features of the Viscount 700D will be: a four-tank fuel system providing individual feed to each engine; "high-activity" airscrews to absorb the additional take-off power of the RDa.6; lower gear ratio reducing cruising tip-speed by 10 per cent and thus lowering airscrew noise level.

The higher landing weight, coupled with a 100 lb increase in zero fuel weight, will enable the Viscount 700D to carry its maximum payload of 12,800 lb over shorter stages than the present series. Long-haul performance benefits from both the extra tankage and the lower specific fuel consumption of the improved Dart. The still-air range of the 700D with a full payload will be 1,450 miles (1,655 miles with slipper tanks) compared with 1,100 miles for the present Viscount 700; cruising speed at mean weight will be 320 m.p.h. as against 303 m.p.h.

BREVITIES

A NEW Air-India service between New Delhi and Tokyo is due to be inaugurated on Sunday, August 15th. Operated by Super Constellations, the service will take 22 hr, with calls at Calcutta, Bangkok and Hongkong.

* * *

M.T.C.A. airport statistics for June show a continued increase in United Kingdom air traffic. Figures for the month, and the percentage increases over the corresponding totals for June 1953, were: 25,930 air transport movements (10); 462,000 passengers (21); 9,800 tons of freight (27) and 1,200 tons of mail (8).

* * *

An Englishman, Mr. Murray Barnes, has been appointed advertising manager of P.A.W.A. Mr. Barnes served with the Navy during the war and joined PanAm in 1948.

* * *

New terminal buildings costing about £100,000 are under construction at Durban Airport and are expected to be ready by March next year. In keeping with the policy of "apartheid", the building provides for segregation of European and non-European passengers. It is also reported from South Africa that work is proceeding well on the new Bellville Airport near Cape Town. Two runways—of 6,600ft and 5,000ft respectively—have been completed and new terminal and control buildings are being erected.

* * *

The first of the two Handley Page Marathons ordered for service in Japan with Far Eastern Air Lines left Blackbushe for Tokyo on August 7th. The Marathon is being ferried by Airwork, Ltd., its crew consisting of Sen. 1st/Off. Riley and Rad/Off. Rylands. The 10,000-mile flight is expected to take nine days and is being made in short stages; refuelling stops are Nice, Bari, Athens, Tripoli, Basra, Bahrein, Sharjah, Karachi, Delhi, Allahabad, Calcutta, Rangoon, Tourane, Hongkong, Tai Pai, Okinawa and Iwakuni.

AFRICAN VISCOUNT: An impression of the Viscount as it will appear in the styling of Central African Airways. The company's initials might be confused with those of America's Airworthiness Administration, which is still studying the question of accepting the British certification. A favourable decision is confidently expected.

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"Flight" photographs

Two views of the new de Havilland control tower, showing its modern external design and the spacious layout of the control room itself. Previously, air traffic control at Hatfield had been exercised from a converted office in the Servicing School building. The new tower is situated at one corner of the company's new flight-test building, itself an excellent example of good contemporary design. The tower's main radio equipment is installed in a separate room below control.

CIVIL AVIATION . . .

HATFIELD'S NEW TOWER

ILLUSTRATED on this page is the new control tower recently constructed and put into use at Hatfield Aerodrome, headquarters of the de Havilland companies. Located at the south-west corner of the new flight-test building, the tower is both refreshingly modern in design and most comprehensively equipped.

A new twin-channel, remotely controlled Marconi AD.200 V.H.F. direction-finder has been installed, and supersedes the earlier-type Marconi set which has been in use at Hatfield for the past 4½ years. The site for the aerial is adjacent to the end of the 2,000-yd runway.

V.H.F. communications equipment is by Marconi and Pye, operating on 123.3, 122.5 and 131.3 mc/s, and 123.3, 122.5 and 117.9 mc/s respectively. The Marconi installation comprises one twin-channel TGV 472A 50-watt transmitter, one twin-channel R.P. 47C receiver, and one H.16A low-power transmitter/receiver, while Pye have provided one 50-watt PTC 751 transmitter/receiver and two low-power PTC 704 transmitter/receivers.

The Pye company is responsible also for I.L.S. equipment which provides an approach to runway 24. The azimuth approach and glide-path transmitters and an inner-marker transmitter are situated at Hatfield, and an outer-marker transmitter at Panshangar, five miles to the north-east.

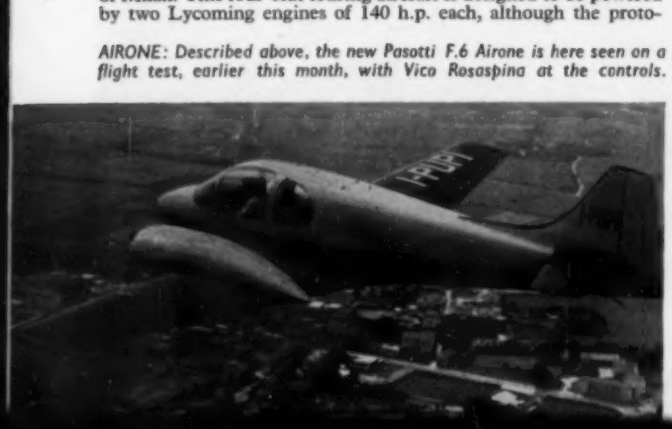
FROM THE CLUBS

FOLLOWING the Chiltern Hills Air Race Meeting (reported on page 206), Miss Freydis Leaf is now leading in this year's British Air Racing Championship, with 56 points. The remainder of the top ten pilots are at present J. N. Somers, 50; H. Wood, 45; W. Bowles, 35; R. R. Paine, 33; G. R. I. Parker, 32; F. Dunkerley, 28; P. Blamire, 27; T. G. Knox, 26; and G. C. Marler, 25.

The only remaining event on this year's calendar in which points will count towards the championship is the Goodyear Trophy Race, to be held at Shoreham on August 28th. This is an international handicap race—British, French, Belgian and Dutch entries are expected—and is open to piston-engined and jet-powered aircraft not exceeding 1,750 kg (3,858 lb) all-up weight. The Southern Aero Club is organizing the event, which is being sponsored by the Goodyear Tyre and Rubber Company by arrangement with F. G. Miles, Ltd., operators at Shoreham.

FLIGHT trials have recently been completed on the Italian Pasotti F.6 Airone, shown in the photograph over the suburbs of Milan. This four-seat touring aircraft is designed to be powered by two Lycoming engines of 140 h.p. each, although the prototype illustrated, I—PUPI, uses two 90-h.p. Continentals. All-up weight of the machine is 1,400 kg (3,085 lb); top speed 310 km/hr (193 m.p.h.); stalling speed 90 km/hr (56 m.p.h); and range 1,100 km (685 miles) at 244 km/hr (152 m.p.h.). Project engineer on the Airone, Stelio Frati, was also responsible for the Ambrosini Rondone. The F.6 design incorporates a retractable tricycle undercarriage.

AIRONE: Described above, the new Pasotti F.6 Airone is here seen on a flight test, earlier this month, with Vico Rosaspina at the controls.



DENHAM FLYING CLUB is looking for pilots to take advantage of the "cheap flying" A.T.C. air experience scheme. For club members with a minimum of 150 hours solo, the cost is as low as 12s 6d per flying hour on the Taylorcraft Plus D and £1 per hour on the Autocrat. Further details from D. C. G. (Wilbur) Wright, the club's C.F.I. (Denham 2161.)

FORTHCOMING EVENTS

Aug. 14.	Royal Aero Club: National Air Touring Competition, Cranfield.
Aug. 28.	Southern Aero Club: Goodyear Trophy Race, Shoreham.
Aug. 18-28.	"Model Engineer" Exhibition, London.
Aug. 29.	Yeadon Aero Club: "At Home."
Aug. 29-30.	Pescara Aero Club: Annunzio Trophy contest, Pescara, Italy.
Sept. 5.	Saar Aero Club: Europa-Pokal display.
Sept. 7-12.	S.B.A.C. Farnborough Display and Exhibition. ("Public" days, 10th, 11th and 12th).
Sept. 9.	Helicopter Association: "Helicopter Contracting," by Knute Flint. (Followed by annual dinner.)
Sept. 9-12.	Royal Aero Club: International invitation air rally, White Waltham.
Sept. 13-19.	Battle of Britain Week.
Sept. 16-17.	Aerodrome Owners' Association: Annual Conference, Northampton and Sywell.
Sept. 18.	R.A.F. "At Home" Day.
Sept. 25-26.	Aero Club of Germany: Hanseatenflug international rally.
Sept. 20-29.	Fédération Aéronautique Internationale: 47th annual general conference, Istanbul.

SERVICE AVIATION

Royal Air Force and Fleet Air Arm News

No. 602 SQUADRON

DINING-IN NIGHT: (Left to right) S/L. R. B. Davidson, the present Commanding Officer, Hon. A.Cdre. the Duke of Hamilton, and G/C. T. B. de la P. Beresford, who is the Station Commander at Pembrey.

FOR their summer camp this year No. 602 (City of Glasgow) Squadron, R.Aux.A.F., went to Pembrey, South Wales; 18 Auxiliary pilots and 90 Auxiliary ground crew attended. The Commanding Officer, S/L. R. B. Davidson, D.F.C., who has recently returned from the U.S.A., is an old Auxiliary member of the squadron.

During the camp, rivalry ran high between the two flights as to which could maintain the greatest operational efficiency. The major part of the flying programme was devoted to air-to-air firing against drogue targets.

In his capacity as Honorary Air Commodore of No. 602 the Duke of Hamilton and Brandon, P.C., G.C.V.O., A.F.C., D.L., visited the camp and was the guest of honour at the dining-in night. The Duke of Hamilton was a pre-war commanding officer of the squadron, and it is by his permission that the famous Grey Douglas tartan is worn, the Glasgow squadron being one of the few units in the Royal Air Force allowed to wear the kilt.

The squadron badge depicts a lion rampant, superimposed on a St. Andrew's Cross, with, below, the motto *Cave Leonem Cruciatum* ("Beware of the Crucified Lion"—the enemy air forces indeed found it appropriate enough during the war).

At the outbreak of hostilities No. 602 Squadron with its neighbouring squadron from Edinburgh No. 603, were two of the seven squadrons forming No. 13 Group Fighter Command. They had the northern third of the country to look after but their main task was the protection of the naval base at Rosyth. During the afternoon of October 16th, 1939, the German Luftwaffe arrived in force over the Firth of Forth and attacked the ships lying there. Despite a radar failure at the critical period the Spitfires of the two squadrons got in among the enemy bombers and shot two down.

Less than a week later came a further success, when a convoy off St. Abbs Head was being attacked by Heinkel IIIs. A section from No. 602, followed by another from No. 603, attacked the raiders and a Heinkel was shot down near Kidlow, six miles south of Haddington. This was the first enemy aircraft to be shot down over Britain—the others fell in the sea. Although the Glasgow squadron got in first, the two squadrons were each credited a half-share of this kill.

By August 13th, 1940, No. 602 Squadron had left Drem and was at Westhampnett, Sussex, fighting hard in the Battle of Britain. Before returning north—to Prestwick—on December 17th, claims were made for 120 enemy aircraft destroyed and a further 44 damaged. Twelve awards, D.F.C., D.F.M. and Bars to both had been won.

Later war years saw them serving in the North African campaign and the Battle of Germany. When Field Marshal Rommel's car was shot up in the desert it was No. 602 Squadron that was credited with the attack.

On account of both operational qualifications and length of service, the Glasgow squadron has earned entitlement to a Squadron Standard. The granting of this has already been announced but the actual presentation has yet to be made.

Shackletons in Ceylon

ABOUT the middle of this month four Shackletons from R.A.F. Station St. Eval, Cornwall, will fly to Negombo to take part in maritime exercises with the

Refuelling and rearming one of No. 602 Squadron's Vampires during Summer Camp at Pembrey. On the right the number of hits on a drogue target is being assessed and cancelled. From the shadow pattern it appears that the unit at least enjoyed a little of this year's fleeting sunshine.

At the top the squadron pipe band is playing before the officers' mess on the occasion of the dining-in night, and Pipe-major A. C. McFadyen receives from G/C. Beresford, D.S.O., D.F.C., the traditional glass of whisky. The lower photographs show some of the ground crews about to embark on a Transport Command Valetta for Scotland and Cdt.Off. J. Wilson climbing from his Vampire on completion of an air-firing exercise.

Royal Navy and the Royal Pakistan and Indian Navies. Aircraft of the Far East Air Force will also take part.

S/L. J. D. Beresford will command the Shackletons, two of which will fly to Ceylon with only one intermediate landing (Habbaniya). The other two will fly via El Adem, Libya, and Khormaksar, Aden. They will remain at Negombo until the end of the month.

Battle of Britain Service

A SERVICE of Thanksgiving for the Victory achieved in the Battle of Britain in 1940 will be held in Westminster Abbey on Sunday, September 19th, at 3 p.m.

Applications for tickets for the Service from widows and bereaved parents of Battle of Britain aircrew and from retired Royal Air Force officers and Battle of Britain pilots who wish to attend the Service should be sent to the Under-Secretary of State, Air Ministry (S.4(d)), Whitehall Gardens, S.W.1, in writing not later than September 4th. In view of the strictly limited number of seats in the Abbey it is regretted that not more than two tickets can be issued to any applicant. Applications should not be sent to the Abbey authorities.

Fighter Station Badges

A BADGE for R.A.F. Station, Biggin Hill, recently approved by the Queen, will be presented by the Air Officer Commanding-in-Chief, Fighter Command, Air Marshal Sir Dermot Boyle, K.C.V.O., K.B.E., C.B., A.F.C., at a parade to be held on the Station on September 19th, Battle of Britain Sunday.

The badge depicts a sword erect enfiled by a circlet of chain. Below is the motto, "The Strongest Link." The sword symbolises the fighting during the 1939-45 war, during which aircraft from Biggin Hill shot down more than 1,000 enemy aircraft and held one of the highest records of any Fighter Command station. The chain by which the sword is enfiled indicates the chain of stations operating in the defence of London and its surroundings.

R.A.F. Station, Biggin Hill, now commanded by W/C. D. G. Smallwood, D.S.O., M.B.E., D.F.C., was formed in 1917 as a night fighter station, and was also a centre for some of the earliest experiments in the use of wireless telephony between the ground and aircraft in flight. It remained a fighter base between the wars, and in 1937, was chosen to carry out the operational trials of radar. At present the station accommodates regular R.A.F. units and Nos. 600 (City of London) and 615 (County of Surrey) Squadrons, R.Aux.A.F.

A well-known Scottish fighter base, R.A.F. Station, Leuchars, will also receive

ROYAL HOLIDAY: The Queen travelled by air on Saturday last to Driffield, Yorkshire, where she spent a few days with Sir Richard and Lady Sykes. Her Majesty is seen after alighting from a Viking of the Queen's Flight and inspecting the guard of honour. She is accompanied by A. Cdre. Sir Edward H. Fielden, K.C.V.O., C.B., D.F.C., A.F.C., Captain of the Queen's Flight, G/C. A. J. Shelfoon, A.F.C., Station Commander, and F/L. L. H. Dawes, D.F.C., officer in charge of guard of honour. The Queen's Colour of the R.A.F was paraded on this occasion, F/L C. M. Hodgson was the bearer.

SERVICE AVIATION . . .

its new station badge during September. The presentation will be made by the A.O.C. No. 12 Group, Fighter Command, A.V-M. W. J. Crisham, C.B., C.B.E.

For many years Leuchars was a Coastal Command station, indicated by a fountain shown in the badge. Also incorporated is a St. Andrew's Cross, to suggest the location of the station, and a claymore, symbolising the fighting spirit of the units based there. The motto is "Attack and Protect." R.A.F. Station, Leuchars is commanded by G/C. P. G. St.G. O'Brian, O.B.E., D.F.C.

Tour by Vampire Trainer

YESTERDAY, August 12th, at 0900 hr, the Secretary of State for Air, Lord De L'Isle and Dudley, V.C., was due to leave West Malling in a Vampire Trainer for a tour of inspection of R.A.F. stations in Scotland and the south of England. The pilot of the Vampire was S/L. J. E. S. Hill, D.S.O., his Personal Air Secretary.

The two-day itinerary of the projected tour was: August 12th: Leave West Malling for Maintenance Command's station at Edzell, Angus, where he was due at 1015 hr. An hour later he was to fly on to the Fighter Command station at Leuchars, Fife, arriving there about 1125. After lunch he would leave for West Malling at 1530 hr.

Today, August 13th: Leave West Malling again at 0930 hr for Boscombe Down, Wilts, to see the new English Electric P.1 fighter before driving to Andover, Hants, to visit H.Q. Maintenance Command (Air Marshal L. G. Harvey, C.B.). The Air Minister is to lunch at Andover and return to West Malling in the afternoon.

R.A.F. Appointments

THE following appointments have been announced by the Air Ministry:—

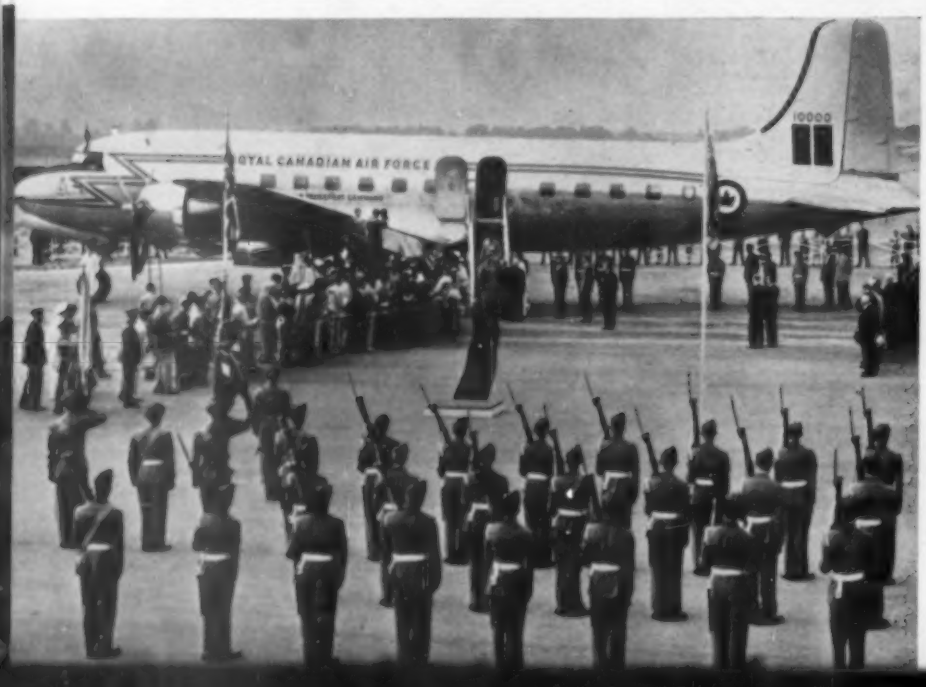
A. Cdre. B. C. Yarde, C.V.O., C.B.E., to be Commandant General of the R.A.F. Regiment and Inspector of Ground Combat Training. He will succeed A.V-M. Sir Francis J. W. Mellersh, K.B.E., A.F.C., who is retiring. The appointment is effective from September and A. Cdre. Yarde will assume the acting rank of air vice-marshal.

A. Cdre. G. P. Chamberlain, C.B., O.B.E., this month becomes A.O.A. at H.Q. Fighter Command, with the acting rank of air vice-marshal.

No. 1 Radio School Parade

AT R.A.F. Station Locking on July 28th the passing-out parade of the 69th Entry to No. 1 Radio School was held. The reviewing officer was Air Marshal T. G. Pike, C.B., C.B.E., D.F.C., Deputy Chief of the Air Staff. With him were A.V-M. N. H. D'Aeth, C.B., C.B.E., A.O.A. Technical Training Command; A. Cdre. R. L. Phillips, C.B.E., A.O.C. No. 27 Group; and G/C. B. Robinson, O.B.E., Commandant of No. 1 Radio School.

In the afternoon Air Marshal Pike addressed the apprentices and presented the prizes. The prizewinners were: *Air Radio Fitters,* Cpl. Air App. R. V. S. Penfold; *Ground Radar Fitters,* Air App. P. R. Potter; *Ground Wireless Fitters,* Air App. M. Aslam. *Highest Educational Marks,* Cpl. Air App. R. V. S. Penfold; *General Service Subjects,* Sgt. Air App. J. Lovell (who also won the prize for the highest aggregate marks). Air App. G. Moir was awarded the Victor Ludorum Trophy.



ROYAL ARRIVAL: The scene on Thursday, July 29th, at R.C.A.F. Station Uplands, Ottawa, on the arrival of the Duke of Edinburgh in the Royal Canadian Air Force Canadair C-5, which had carried him from Tangmere via Iceland. It was piloted by W/C. H. A. Morrison.

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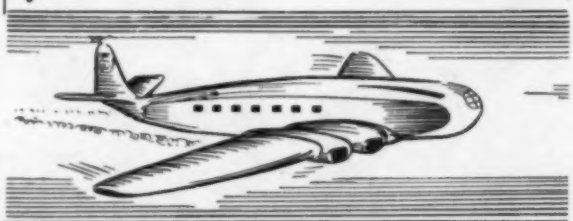

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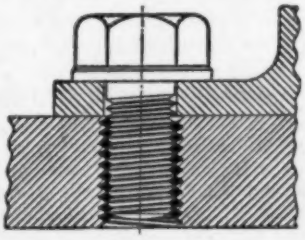

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THESE applications will be considered by the Council under the Terms of Reference issued to them by the Minister of Civil Aviation on July 30th, 1952. Any representations or objections with regard to these applications must be made in writing stating the reasons and must reach the Council within 14 days of the date of this advertisement, addressed to the Secretary, Air Transport Advisory Council, 3 Dean's Yard, Westminster, London S.W.1, from whom further details of the applications may be obtained. When an objection is made to an application by another air transport company on the grounds that they are applying to operate the route or part of route in question, their application, if not already submitted to the Council, should reach them within the period allowed for the making of representations or objections. [2429

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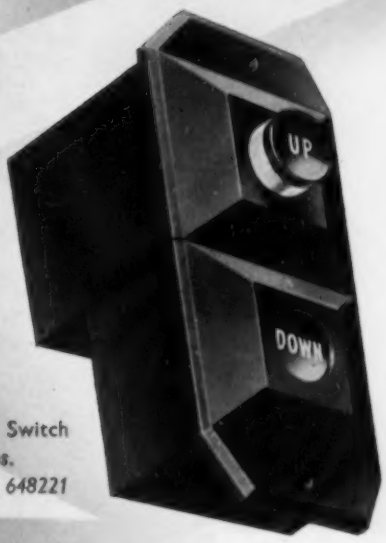

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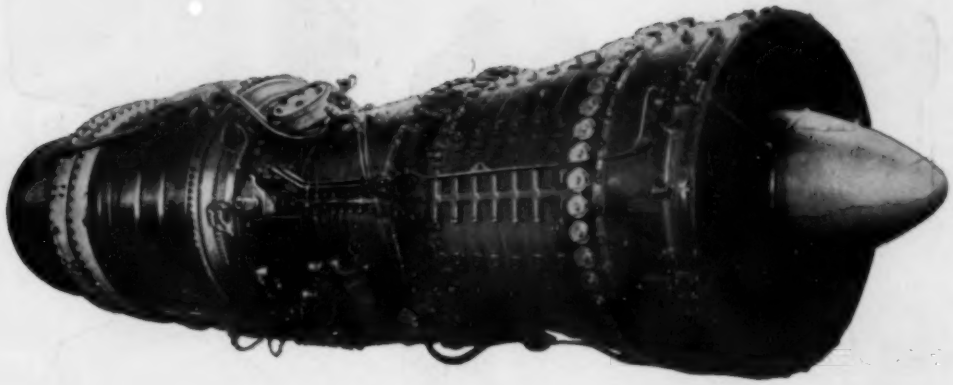

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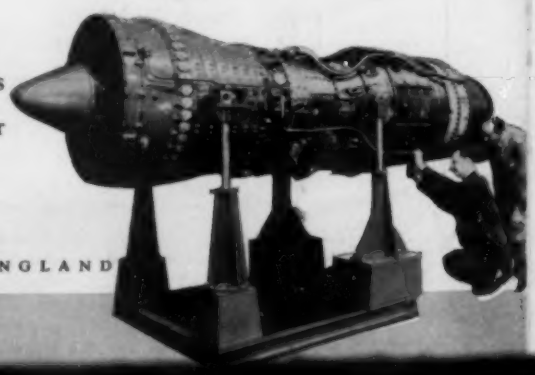

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